"Journal of Gas Lighting, Water Supply, and Sanitary Improvement."—Aug. 1, 1916.—Registered as a Newspaper.

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JOURNAL OF GAS LIGHTING & WATER SUPPLY.

EDITOR & PUBLISHER: WALTER KING. OFFICE: 11, BOLT COURT, FLEET ST. LONDON.

VOL. CXXXV., No. 2777.] TUESDAY, AUGUST 1, 1916. [68TH YEAR.

EDITORIAL NOTES.

The Gas Light and Coke Company under Exceptional Circumstances.

THE proprietors of the Gas Light and Coke Company will meet for the first time next Friday under the shadow of the great loss of a Governor whose brain and activities were pledged and devoted, and with successful result, to the raising of the immense concern from the deplorable state into which it had been allowed to sink by long administrative attachment to a narrow and mistaken policy. Had things not been ordered as they were mainly through the power which the governorship gave him, in all probability the Company would have been in a very incompetent condition to meet the tremendous difficulties of the present time. The work for the Company of Sir Corbet Woodall was gigantic and memorable. This will project itself in the proceedings on Friday, when, too, the proprietors will miss that personal endowment of an unusual charm of manner which enabled him to dress with interest even dry-as-dust and matter-of-fact details appertaining to the operations of the Company. But human losses are inevitable; and the proprietors, in the midst of their sorrow, will not neglect both welcome and encouragement to those who have undertaken greater responsibilities than they have hitherto possessed in the administration of the vast undertaking. Reconstruction of the Board has been largely by elevation; for, although there have been two recent losses by death—Sir Hugh Owen having predeceased Sir Corbet—there will be only one fresh face at the Board table—that of the Right Hon. Sir Daniel Goddard, M.P., inasmuch as the former General Manager (Mr. D. Milne Watson) has been raised to the dignity of Managing-Director, and he is as well known to the proprietors as, perhaps better than, the majority of the other Directors. The responsibility of the governorship is now upon the shoulders of the previous Deputy-Governor, Mr. John Miles, and that of the Deputy-Governor upon those of Mr. H. Jameson Waterlow. The actual changes have therefore been as limited as possible; and as Sir Daniel Goddard was an old colleague of Sir Corbet in another place, the proprietors may have most complete confidence that the reconstituted Board will continue along the paths of policy that have, in the past decade, with certainty led to the regeneration of the concern.

Men come and men go; but the Gas Light Company continues and increases its public and business services. Considering the harassing and difficult war circumstances of the past half year, it is a good account which the new Governor will have to present, and which must in the depicted results exceed the anticipations of those who were in the position to estimate the probabilities. The balance forward—£480,512—is greater by £33,898 than was brought into the half year; but the immediate future will want all that can be preserved to help to meet known commitments and to guard against any unforeseen contingencies. There has been good spending, too, during the half year on maintenance, repairs, and renewals. The sales of gas were larger than in the corresponding half of 1915; and the influx of consumers and of new stove connections is, in the current circumstances, on an excellent scale. Coal and oil stand at considerably greater cost; but, on the other hand, residuals have done well. Still the net cost of materials shows a considerable addition compared with the June half of 1915, and nearly double as great as that addition when compared with the corresponding period of 1914. The proprietors, however, may well congratulate themselves and their Chief Engineer (Mr. Thomas Goulden) and his staff upon the technical working having surpassed all former standards; otherwise the expenditure upon raw materials would have been much heavier. The consumers, too, in view of the cost of materials, have some cause for congratulation that, through the largely counterbalancing influences of residuals and good working, it has not been found necessary to still further advance the price of gas.

The figures will accentuate these features of the half-year's history better than any words of ours could do. In the six months, no less than £1,105,886 was spent on 897,689 tons of coal, which expenditure is an increase of £392,672 as compared with the first half of 1915. But to set against this the quantity of coal carbonized shows an increase of 160,993 tons. Contrasted with the June half of 1914—the final period before war was declared—the expenditure on coal is £317,485 more, although 40,415 tons less were carbonized. Oil is in equally lamentable case; for £112,766 was spent upon 7,246,581 gallons In other words, the expenditure was £11,531 more than in the June half of 1915, though the substantial quantity of 4,429,166 gallons less was used. The figures indicate that—probably through the triple causes of the high price of oil (largely due to freights), shortage of supply, and the excellent prices of residuals—there was greater reliance in the half year on coal gas, and less on carburetted water gas. For the coke and breeze for carburetted water-gas manufacture, £66,146 was spent, or a reduction of £1239. The total sum expended in the six months for manufacturing materials was £1,284,798, as compared with £881,835 in the first half of 1915—an increase of £402,963. As residuals produced £758,206 (or £318,757 more than in the June half of last year), the net cost of the raw materials amounted to £526,592, which was an increase of £84,206 upon the corresponding half of 1915, and £156,266 more than in the first half of 1914, in which period no less than 525,756,000 cubic feet more gas were made. These figures disclose the seriousness of the conditions, and the indebtedness of the half year to residuals, which all through gave a good account of themselves—coke producing £445,352, thus giving an extra £190,371; tar and tar products yielding £134,163, and contributing an additional £63,069; and sulphate of ammonia producing £148,143, and giving a further £66,281.

As already said, there were carbonized in the half year 897,689 tons of coal, and 7,246,581 gallons of oil were used, from which, with coke and breeze, 14,885,868,000 cubic feet of gas were made, or an increase over the first half of 1915 of 474,246,000 cubic feet. Of this make, 11,430,508,000 cubic feet were coal gas, and 3,455,360,000 cubic feet were carburetted water gas; the latter being a reduction of 1,346,910,000 cubic feet. Here is seen how good working contributed to lightening the malignant conditions of the half year; for 12,733 cubic feet of gas per ton of coal were made, or 366 cubic feet more than in the June half of 1915. This 366 cubic feet multiplied by the tonnage of coal carbonized represents a make of 328,554,174 cubic feet above what would have been the case had the production per ton remained at the average level of January-June last year. This increased yield is more than the additional quantity sold in the half year—260,491,000 cubic feet. There was a saving, too, on the amount of oil used per 1000 cubic feet of carburetted water gas. The quantity was 2·09 gallons, compared with 2·43 gallons, or a saving of 0·34 gallon, which meant in the aggregate no less an economy than 1,174,822 gallons. Before leaving these particulars as to manufacture, there are figures which show the gravity of the situation in respect of coal deliveries. Though the quantity of coal carbonized in the half year was 897,689 tons (to which have to be added 1909 tons used for other purposes), only 784,402 tons were delivered—that is to say, stock was eaten into to the extent of 115,196 tons. In other words, the half year commenced with 267,772 tons in store, and ended with 152,576 tons; while at the end of the normal June half of 1914, there were 232,764 tons in stock. Thus the stock at June 30 last is worse by 80,188 tons than two years ago. However, the Board have been protecting the Company's

interests as far as possible in this respect by increasing the fleet of steamers by the purchase of "several" more.

An increased output of gas in contrast with the first half of 1915 indicates an increased sale. The consumption for payment was actually 13,714,244,000 cubic feet—an advance of 260,491,000 cubic feet, or close upon 2 per cent. This is interesting in view of daylight saving, reduced shop lighting, and short-hour requirements of licensed premises. A further point of interest is that the increase in private consumption was 298,403,000 cubic feet; but there was an extra loss on public lighting, largely through military restrictions, amounting to 37,912,000 cubic feet. The sale for the half year is less by 345,210,000 cubic feet than in the corresponding normal six months of 1914; but it is less by only 85,936,000 cubic feet than in the first half of 1913, which is a difference that is not great in the extensive business of the Gas Light and Coke Company. With prices of 3s. and 2s. 10d., as compared with 2s. 8d., 3s., 2s. 4d., and 2s. 10d. in the corresponding half year, £2,018,634 was received for gas, or an additional £163,890—due to the enhanced business as well as to higher price. There was also an increase all along the line in the rental of meters, stoves, and fittings—the total being £249,135, of which £10,150 was increase. The report shows, too, despite the war, that the number of consumers has received an addition of 4575, and gas-stoves sold and let on hire 18,097.

It is unnecessary to enter into comparisons of items upon the expenditure side of the account. Salaries, wages, and repair, maintenance, and renewal of works, mains and services, meters, and stoves, have all increased—some of the increases of the latter being due to the higher cost of labour and materials. Practically everything upon which outlay is made has been upward bound in price, except, among the important items, "co-partnership," which suffers in unison with the ordinary proprietors. The total expenditure was £2,436,272—an increase of £527,088. The total income was £3,032,773—an increase of £493,549. So that the augmentation of income was short of that of expenditure by £33,539. The amount carried to net revenue account is £596,500, compared with £630,039. How this sum and the total available balance are dealt with is shown in the Directors' report and the accounts, reproduced in other columns. The dividend is (under the sliding-scale) £4 4s. per cent., which compares with £4 17s. 4d. in the half year preceding the war. But the proprietors and consumers alike will have satisfaction in learning that the sum carried forward (£480,512) is £33,898 greater than was brought into the half year, and £44,454 more than was in hand at the end of the June half of 1915. The additional sum will be much needed, in view of the Directors' statement that contracts for coal show a considerable increase over those of last year, and that the prices that are being paid for the necessary quantity of oil are very high.

The First War Price Reduction in London.

SURPRISES are occasionally sprung upon the gas industry, and upon the proprietors and consumers of the South Metropolitan Gas Company, by Mr. Charles Carpenter, D.Sc., the Chairman of the latter, and his directorial colleagues. The report for the past half year has for its principal feature a surprise, which, although it is so, will be no less welcome alike to the gas consumers and to the proprietors and employee co-partners. It is an announcement that the price of gas, which for the past fifteen months has stood at 2s. 10d. per 1000 cubic feet—having been raised to this figure first by an increase of 2d. then of 6d.—is to be lowered to 2s. 8d., which will make it only 6d. more than the price that obtained for some years preceding the outbreak of war. The correctness of taking this step at this time of burdensome costs must be accepted as the decision of an exceedingly competent Board, who have critically examined the position in the light of detailed facts that are open to them, and which, on the whole figures appearing on the face of the accounts, are not ascertainable by others with the same degree of precision—accounts which show, compared with the first half of 1915, a few millions increase in the consumption of gas, an increase in the receipts for gas (at the 2s. 10d. price) of £120,623, an increase from residuals topping the corresponding figure by £132,136, but a cost for coal some £101,564 higher, with the net cost, however, through the higher income from residuals, £30,572 less. Accounts, too, which show greater costs in several other directions; but, on balance, delivering to the net revenue account a sum that is £41,039 more than twelve months ago. The 2d. reduction probably means upwards of £50,000 on a half-year's consumption; and something more will have to be added to this for increased dividend and co-partnership. But the increase in price was made on consideration of certain factors; and the South Metropolitan Company have always, in periods of weal or of difficulty, shown—sometimes it has been thought extreme—fidelity to the principle of co-partnership with consumers, who have recognized and appreciated it. One of the factors was the freight from the North. Before the war, the Company were content with chartering vessels for carrying coal; but, since then, the extraordinary rise in freights has persuaded the Board not to longer trust to the precarious conditions in this respect set up by market vicissitudes, and the beautifully elastic law of supply and demand, but to make the Company independent of them by the possession of their own steamships. This new possession and freedom, with the consequent lower costs for transport, influence one of the factors that had to be considered when the price of gas was raised; and the effect produced by the change the Directors have determined the gas consumers shall share by the reduction of the price charged them. The consumers will be gratified; the proprietors will be equally so, for the pre-war dividend at the rate of £5 9s. 4d. per cent. has shrunk to £4 8s., subject to heavier income-tax, but the lower price of gas will restore 5s. 4d. per cent. per annum to the depreciated dividend.

The announcement is the masterpiece of the report and accounts; for, as a matter of fact, beyond the points already made as to the showings of the accounts, there is little else, except for the interest to be extracted from comparison, upon which to comment. But briefly, the total outlay on coal was £693,284—an increase of £101,564 in comparison with the same period of the previous year, although the quantity of coal carbonized was 510 tons less; the amount carbonized having been 569,029 tons, as compared with 569,539 tons. But residuals, yielding £455,451, gave an increase of £132,136, of which addition coke contributed £93,323, tar and tar products £29,838, and sulphate of ammonia £16,247, with £7271 less receipts from breeze. The higher income from residuals brought the net cost of coal to £238,373, contrasted with £268,945 in the June half of 1915, or £30,572 less, despite the fact that the gross cost of coal was, as stated in the opening paragraph, £101,564 more. The Company, it appears, are now keeping the production of gas at an approximately constant level per ton. In the half year 6,969,806,000 cubic feet were made from the 569,029 tons of coal carbonized, which give an average of 12,241 cubic feet per ton, compared with 12,179 cubic feet in the June half of 1915, and 12,278 cubic feet in the December half of that year. While dealing with coal, it may be mentioned that, as in the case of the Gas Light and Coke Company, the bad conditions of supply and transport are reflected in the statement as to coal. Adding 1376 tons "used" to the amount carbonized, makes a total consumption of 570,405 tons in the half year; while only 471,721 tons were received. So the stock of coal, which at Dec. 31 last stood at 227,200 tons, has been diminished to the extent of 98,684 tons; leaving in store 128,516 tons, as against 153,498 tons at June, 1915, and 181,056 tons at June, 1914—that is to say, the stock at June 30 last was worse off by 52,540 tons than two years previously.

The Directors in their report state that the consumption of gas in the half year was "practically the same" as in the June half of 1915. They are modest. They deal with big figures; and an increase of 47,566,000 cubic feet out of a total sale of 6,674,289,000 cubic feet may not appear to be relatively great, but it is not negligible, and is better than a corresponding amount on the other side. The result indicates that the consumption reducing effects of the Daylight Saving Act have been counterbalanced by a heavier demand in other directions—the Directors mention "increased industrial activity." Private consumption in the half year (6,564,966,000 cubic feet), as a fact, advanced by 54,588,000 cubic feet; the difference between this figure and the net increase over the whole business being accounted for by the public lamp consumption (109,323,000 cubic feet) slipping back 7,022,000 cubic feet owing to the more stringent lighting regulations. The total receipts for gas were £921,328, or £120,623 more than in the first half of 1915. But, in the Lady-day quarter last year, the ordinary price was only 2s. 4d., while in the Midsummer quarter it was 2s. 10d.—the price which has obtained throughout the past

half year. The items of rent of meters, stoves and fires, and gas-fittings individually show small increases, but collectively £2213—the income of £130,277 from these sources in the June half of last year having risen to £132,490. In this connection, we are sorry to see the cessation of particulars that have for very many years given added interest to the Company's accounts—that is to say, the number of ordinary and slot meters, ordinary and slot stoves, and fires for which rental is paid. Other companies, it is true, do not incorporate the information in their revenue account; but then the South Metropolitan Company have a reputation for not caring for custom, nor for conforming to the ways of contemporaries, but, if thought proper, striking out upon new lines on their own account.

Glancing down the expenditure side of the revenue account, the items—save that of coal—do not show any very striking differences. Such as they are, they are only what might be expected from the ruling conditions. Labour and materials generally all cost more. For instance, in repairs and maintenance of works, there is a difference in the upward direction of £37,463; the expenditure under this item having been £138,166. Distribution, too, has cost £178,862, or £46,852 more—the increase being chiefly for repairs, maintenance, and renewals of mains, service-pipes, meters, stoves, and fittings. The charge for co-partnership suffered considerable diminution; but any regrets by the men on this score (quite apart from the fact that the reduction is the result of a real co-partnership) will be greatly ameliorated by the additional requirements for wages, and by the drafts on the revenue of £17,160 (£5040 extra) for the superannuation, sick, and accident funds, of £43,461 (£25,844 additional) for war bonus and war fund, and about £700 more under the National Insurance Act. In the result, the trading account shows a total income of £1,510,611, or an increase of £254,773; and a total expenditure of £1,280,432, or an increase of £213,734. The additional income meets the extra outlay, with £41,039 to spare, which is the sum by which the balance transferred to net revenue account (£230,179) is an improvement upon the financial result of twelve months since.

The report on this occasion is interesting in other respects. It is noticed that Mr. Frank H. Jones is now the tenant of the deputy-chair, succeeding Mr. Kenneth P. Hawksley, who followed Mr. Frank Bush. At this rate, all the ordinary Directors will soon have had a turn in the deputy chair. Since the last meeting, the Board have lost a good colleague in Mr. Laurence W. S. Rostron, who was by profession a barrister. The candidate for the vacant position is Mr. E. Honoratus Lloyd, K.C., whose work and experience in the Parliamentary Committee Rooms in connection with gas legislation have been extensive. The Chairman, too, will doubtless have something to say at the meeting to-morrow week about the Company's new Act, about the gallant fellows at the front, and about the means taken (with the results) to compensate the heavy demands by the war upon the man power of the concern. Altogether this war time account, which supplies an interesting chapter in the history of the Company, is one which should give much gratification to all concerned.

Widnes Surrenders.

It fell to our lot a fortnight ago to animadvert somewhat strongly upon the attitude of ten of the town councillors of Widnes, in the matter of vetoing a recommendation of the Gas Committee that they should be allowed to comply with the desire of the Ministry of Munitions that the gas should be oil-washed, with the view to the recovery from it of a larger proportion of benzol and toluol. The vote of these ten councillors not only negatived the proposal of the Gas Committee, but it was a direct flouting of the Ministry of Munitions, and, to say the least, was an unpatriotic act, whatever excuses may now be made. The opposition was too determined at the time for any ready acceptance now, on the part of disinterested observers, of the assertion that their action was all a mistake, due to an insufficient knowledge as to the actual effects of the application of the more effective washing process. If, however, this is true, then it is a grave reflection upon the fitness of these councillors to be members of the local governing body; for in such a matter as this—a matter of life or death for this and other nations—it ought to have been the business of the Widnes councillors, before voting in the manner they did, to ascertain without any possible doubt whether or not they were doing the correct thing, and had in mind the exact facts. That they did not do this, was shown by the way some of the members in their speeches floundered about in a mass of inaccuracy—just as did Mr. George Davis, at the meeting last week, when the previous resolution was rescinded. His speech in opposition to the rescinding was a mixture of ignorance and misstatement as to the effects of what the Committee had proposed. It appears that, since the former meeting, certain members of the Council, accompanied by Alderman Timmis, the Chairman of the Gas Committee, and Mr. Isaac Carr, the Gas Engineer, had accepted an invitation of Mr. F. L. Halford, of the Explosives Supplies Department of the Ministry of Munitions, to a conference with him and Mr. W. Doig Gibb; and there appears to have been on that occasion some friendly but straight and informative talk, from which certain of the opposing members issued probably sadder but certainly wiser men. There was no intimidation; but it was made quite clear that, if the Ministry of Munitions were forced by circumstances, or through similar displays of obstruction, steps would have to be taken to lighten the work of the department by making compulsory the application of the oil-washing process. Those who cause the work of the department to be more difficult and burdensome at such a time as this ought to be made to feel thoroughly ashamed of their own action.

Alliance of the Chemical and Coal Carbonization Industries.

Between the chemical and the gas industries, there is an interdependence which hitherto has been inadequately recognized. The one has looked upon the other as more or less a commercial convenience; nothing more. The gas industry has found the chemical industry a convenience for the disposal of its liquid products; and the chemical industry has simply regarded the gas industry as the convenient source of much of the raw materials required for chemical manufacture. The interest that the one took in the other was anything but of a technical nature; interest began and ended in the one question for the gas industry as to what was the highest price at which it could dispose of its liquid products, and for the chemical industry as to what was the lowest price at which it could satisfy its needs. And till the new fields of use—for tar particularly—opened up, the tar-distilling and chemical industries had much their own way as to the payment of a beggarly price, seeing that production of the crude material was constant, and on an increasing scale with the development of the bye-product coking industry, and the enlargement of the use of town gas.

However, the proceedings at the recent annual meeting of the Society of Chemical Industry, as reported last week, suggest that interest is going to develop into something more intimate in future. The one fact that Mr. Charles Carpenter, D.Sc., is President of the Society indicates more than that the South Metropolitan Gas Company (of which he is the head) occupy a prominent place among chemical manufacturers. It is a recognition of the interdependence of the two industries, owing to the gas industry being the source of so much that the chemical industry cannot economically provide on its own account. Never before, too, can it be said that the proceedings at the Society's annual meeting have taken such character as those at the last one. Almost from beginning to end, little was said about manufactured products, but much was said and considered bearing upon the principal raw material used by the gas industry, and upon the crude secondary products that result from that use. There was some talk of legislative prohibition of the use of raw coal. This no doubt is what we shall come to—in time; but the abolition of such use is not to be achieved by a mere stroke of the pen. Those who fancy it could be, would, we incline to think, speedily be disillusioned by the results of any such decree, and by the outburst of indignation among the people over the arbitrary procedure. Prohibition would need very gradual application in order to render it practicable, seeing that the alternatives in fuel and appliances are not immediately available in sufficient volume and numbers to compensate for the removal from use of millions of tons of coal, and the appliances which have been the seats of so much destruction of value in the past. Reformation cannot therefore come by drastic process, though it would not be such a difficult matter to accelerate the rate of progress if the people had been educated

to look upon coal as the source not only of heat energy, but of much else the country cannot do without, and which would, if all of potential value in the coal—the primary materials required for dye-stuffs and explosives and in many branches of the organic chemical industry—were conserved and brought into proper use, substantially raise the status of the country in the matter of independence.

If, however, the Legislature ever moves in the matter of prohibition (though this would be of infinite advantage to the gas industry), we hope that it will first take counsel with practical men, and not listen to the frothy ebullitions of those whose well-displayed superficiality in these matters, while it may please the people in the gallery, is, to those technically qualified to judge, the most ludicrous and distasteful part of their public performances. There are some men who are particularly apt at grasping the ideas of other people, and then on every available opportunity cackling over them as though the ideas were of their own conception. The idea of low-temperature carbonization, and of the production of a "soft" coke, has been in existence a long time; but related to it and the results are technical and commercial questions that require handling by men of technical and commercial experience and skill. Professor Henry E. Armstrong is of opinion that "soft" coke will be much required in the future, together with gas, for heating purposes. If this be so, then the gas industry, he says, will have to set about reconstructing itself. A coke of the physical characteristics of that yielded by low-temperature carbonization is not the only brand of coke that is wanted. Soft coke is very unsuitable for many processes; and its production still leaves value in the carbonized material that is much wanted elsewhere. The gas industry is watchful of the trend of events; and its counsellors are not asleep. Professor Armstrong would advise the industry to undermine its own commercial stability by pursuing a course of technical and economic folly, which would cause it to handle much more raw material in proportion to the products from it, get less from its plant, and so increase its capital and working expenses, and generally make its commodities dearer to the purchasers. He quite unconsciously gives an illustration of his incompetence to deal with this particular question from the practical point of view, by reference to the scheme that has been mooted for the construction at Brighton of a coalite plant, the gas from which the Corporation Electrical Engineer is proposing to use for the generation of steam for his turbines [*ante*, p. 63]. Now Professor Armstrong seems to think that it would be but a small departure from this scheme to obtain an Act forbidding the use of raw coal in the district, which would make the soft coke produced of special value to the town. The obtaining of the Act might be only a small departure; the consequences would not be. Perhaps Professor Armstrong would like to find the capital to put down coalite plant sufficient for the purpose, perhaps he would find pleasure in undertaking to find customers for the gas produced, perhaps, too, he would be pleased to make provision for any financial losses occasioned by his wild-goose venture, in the face of the competition of gas and coke provided by the local statutory undertaking.

But while Professor Armstrong and his like are looking to commercial success attending the conversion of the gas industry to low-temperature carbonization, thus completely forsaking the economic lines on which the industry's work is run, and which lines there is hope of developing, other readers of papers and speakers at the meeting deprecated waste of coal and its constituents in every direction. Coal is a fecund national asset; and, says Professor Louis, not even the coal that is now left in the ground on account of its inferior quality ought, in the nation's interests, to be permitted to remain unworked, and so lost. The inferior coal ought to be dealt with in gas-producers, the gas used for power purposes in the collieries, and the bye-products developed in the chemical works. Passing from the raw material, we find Dr. Lishman advocating improvements in coke-oven practice, with the view of bringing about a more economical state from which to assist in the great industrial and commercial up-building of which there are golden dreams; while Mr. G. T. Purves treated of improvements which he has in mind for eliminating tar fog from hot gas, and for realizing the fractional collection of tar. Then in papers by Mr. C. M. Whittaker, B.Sc., of British Dyes Limited, and by Mr. W. H. Coleman, the members were shown the close relationship that exists between the coal-carbonizing and chemical industries, and the enormous possibilities resident in the continued development of this relationship. Finally, Mr. F. H. Carr spoke of the large opportunity that is presented to the British chemical industry by the awakening and the revelations brought about by the cessation of trading with Germany.

Never before has the Society paid so much heed to the correlation of the interests of the two industries; never before have the members considered the possibilities collectively that there are in preventing waste of coal, in treating it on the most profitable lines, and in preserving and developing its valuable constituents to the economic advantage of the country. The work that presents itself is vast, and should be of reciprocal benefit, if the chemical and the coal-carbonizing industries are to run in double harness with the view to a common progress. There has not always been equity in the past in the purchase of raw material resulting from coal carbonization; in future the raw material must be bought on its actual and ascertained value. Only in this way can the gas industry profit; and it is minded to so profit, and, if compelled, to take the necessary steps to ensure it by the promotion, directly or indirectly, of further enterprise on its own behalf.

Undue Preference Again.

In the "Electricity Supply Memoranda" for July 11, reference was made to further threatened "undue preference" litigation in which the Hackney Borough Council are indicated as offenders; the Gas Light and Coke Company being accusers. The Council provide at a reduced charge electricity for lighting purposes to consumers who also use electrical energy for power purposes. In the Long Eaton case, the Council reversed the bestowal of favour—giving users of current for lighting energy for power at a lower price. The Gas Light Company are advised by Counsel that the Hackney plan constitutes "undue preference," and is therefore a breach of sections 19 and 20 of the Electric Lighting Act, 1882. Counsel for the Borough Council assert there is no undue preference. The Company, however, naturally incline to the view of their own Counsel, and so have pointed out that, unless the Borough Council desist, there is no alternative to legal proceedings. The Electricity Committee sought to procrastinate in the matter of the submission of the issue to the Courts. They referred to "prevailing conditions," and to the staff being "more than usually busy" owing to the manufacture of components for high explosives. But all this does not justify the continuance of an illegality, if illegality there be. The Company therefore sent in their ultimatum, expressing preparedness to delay proceedings upon an undertaking from the Council not, during the continuance of the war, to offer to further consumers the scale of charges to which exception is taken. The Electricity Supply Committee would not recommend that an undertaking be given; and last Thursday they sought authority from the Council to authorize all necessary steps to defend any action the Gas Light Company may initiate. A local report does not inform us as to the formal decision then come to; but one enthusiastic member advised the Electricity Committee to "stick to their guns." "Sticking to their guns" in this matter of undue preference has been an expensive game for other authorities.

Coal Gas as a Motor Fuel.

The "Commercial Motor" has revived the question as to the use of compressed coal gas as motor fuel in place of petrol. It is not a new subject. Coal gas has long been used for motor-testing purposes; and it has also been tried previously for traction use. But the present price of petrol lends attraction to the proposal; and so the matter is being again discussed, and practicability explored. If coal gas can be economically used in place of petrol, it opens up a very large field both from a commercial and technical point of view. Authorities tell us that to use coal gas no radical changes will be required so far as the engines themselves are concerned; and that it is possible to use petrol or coal gas at will. From the technical or chemical aspect, there will undoubtedly occur a number of most interesting problems owing to the high pressure to which the gas will have to be compressed. One suggestion is 1800 lbs. per square inch; this being on account of the storage space. One of the questions that will occur is whether any of the constituents of the coal gas will be liquefied at this pressure. A pressure of 1800 lbs. per square inch is equal to

approximately 122 atmospheres. If the gas was compressed in three stages up to 122 atmospheres, would it eliminate the liquefaction of some of the gases? The hydrogen, methane, carbon monoxide, and nitrogen appear to be fairly safe, owing to their low critical temperatures; but the saturated and unsaturated hydrocarbons would undoubtedly come down, as also would the carbon dioxide. With regard to storage space, this seems to be one of the main difficulties, but would without doubt soon be surmounted. Taking Boyle's Law as being approximately correct at this pressure, and the temperature of the gas as constant, then 1 cubic foot of gas at 1800 lbs. per square inch will be equal to 122 cubic feet at normal pressure, which means that a 25-horse power motor would require 20 cubic feet storage bottles for eight hours' continuous work. It is understood that the South Metropolitan Gas Company are already well on with tests in this direction; and we shall look forward to the publication of the results of their experiments from a commercial point of view—as to the cost of the compressing plant and compressing—and also from the chemical aspect.

Thinning Dehydrated Tar for Road Work.

Owing to the high temperature at which the Ministry of Munitions now requires gas companies to work their tar stills—230° C. (446° Fahr.)—in order to extract the whole of the phenols, the question of supplying a suitable tar for road work has come particularly to the fore. The prepared tar produced at this temperature, although it is according to the specification of the Road Board, is not good for road work. A gallon does not nearly cover the same area of road as the crude tar; the cost of labour per superficial yard is greatly increased; so also is the wear and tear of tools; and an extra amount of grit has to be used. Though the tar is boiling when applied, immediately on coming into contact with the road it becomes almost too stiff to work. Owing to the extraction of the light oils, the penetrating power of the tar is practically *nil;* the result being that, as soon as the road is subjected to any heavy traffic, the tar peels off. The use of creosote oil for the purpose of thinning-down tar is quite an old practice. It is found that the addition of 10 per cent. of open creosote oil practically eliminates all the defects mentioned; the penetrating power of the tar being quite good. The increased area covered per gallon, the saving in labour, grit, &c., more than compensate the extra cost incurred by the addition of the creosote. The extra cost of adding 10 per cent. of open creosote oil works out to under ½d. per gallon of tar. To obtain a good homogenous mixture, it is as well, when possible, to run the creosote into the barrel at the same time as the prepared tar, especially when the barrels are filled direct from the dehydrating plant while the tar is still hot.

A Representative and Active Organization.

At one time there was a disposition on the part of certain makers of sulphate of ammonia to stand aloof from the Sulphate of Ammonia Association. But what is the position to-day? The production represented by the Association is no less than 325,447 tons, which is getting far on the high road to complete inclusion of the makers, large and small. The Association is powerful, and is recognized by all the Government departments. Its defensive work has been great during the war; and it is not too much to say that, had it not been for the existence and pertinacity of the Association, and of the Chairman (Mr. D. Milne Watson) and his colleagues, the sulphate of ammonia industry would, during these times, have suffered considerable and continued trading and manufacturing drawbacks. Where there is no organization in an industry, and it is composed of dissociated units, it is weak, and is exposed to the attacks of all who have an interest prompted by selfishness. And looking to the future, British produced sulphate of ammonia will need all the foresight, means of information, and defensive power that can be brought to bear in the commercial struggle that is going to take place. As to the work in the past year, thanks are due to the Association for what it did in bringing about the liberation of the sulphate of ammonia industry from the chains which, forged by Government departments at the instance of Farmers' Associations, for a time bound its entire produce to this country, which offered a market for only a part of it. To the credit of the Association, too, is the limitation put upon the prices of the different qualities of sulphuric acid. The annual report (it is reproduced in our columns this week) is worth reading, as it shows the many channels of unobtrusive but effective activity of the organization. That activity includes scientific, as well as commercial work; and every bit of it is valuable and indispensable.

Industrial Education in Birmingham.

It is as certain as anything in this world, that a large part of the time and money now expended on the education of the working classes is ultimately wasted, though, of course, it is impossible to know beforehand exactly which particular part this will turn out to be. There need be no fear of any lad learning too much, if he is going to try and utilize to the fullest extent afterwards the knowledge so obtained; the waste of time and money comes in when what is learnt is not subsequently made good use of. It is from this point of view that so many people have deplored the decay of the apprenticeship system—which, however, others contend is hopelessly out of touch with present-day conditions. From Birmingham, if from anywhere, one might hope to obtain authoritative opinions on this question, which is of the very first importance to the industrial community; and therefore one turns with interest to a discussion, which took place at last week's City Council meeting—only to find that opinions are as divided there as elsewhere. The debate arose on a resolution to the effect that industrial education in Birmingham was inadequate to the manufacturing reputation and needs of the city; that it was of the highest importance that the principle of the apprenticeship system should be reverted to as the most inexpensive and efficient means of insisting that boys learned their trades properly; and that it should be a recommendation to the Education Committee to appoint a Sub-Committee, including a few employers of skilled workmen, to devise a scheme of apprenticeship suitable to modern conditions, and of which the Education Committee should be an indentured party, for the purpose of preserving and promoting the highest forms of industrial skill and self-reliance in the interest of workers, employers, and the nation generally. It was argued that it was the apprenticeship system which had built-up the trade of the Empire; and it was the solid rock on which thorough industrial training should be started. On the other hand, it was urged that the principle and practice of apprenticeship were out of date, and altogether inapplicable to the bulk of the industries. However, after the matter had been fairly discussed, and it had been pointed out that the Education Committee had no power to enter into the indentures suggested (except possibly in the case of a boy in an industrial school), it was agreed that the resolution should be referred to the Committee to consider and report.

EXAMINATIONS IN "GAS ENGINEERING," "GAS SUPPLY," AND "GAS-FITTING."

Third List of Successful Candidates—See ante, pp. 111, 154.

GAS ENGINEERING.

Grade I.:

First Class:	Second Class:
King, L. F.	Keaney, T.

GAS SUPPLY.

Final Grade:	Grade I.:
First Class:	First Class:
Weekes, R. C.	King, L. F. M'Lusky, J.

GAS FITTING.

Grade I.:
First Class:
King, L. F. M'Lusky, J.

The vacancy on the Board of the Dover Gas Company caused by the death of Mr. Martyn Mowle has been filled by the appointment of Mr. Henry Crundall.

According to the United States Census Bureau, the value of the annual production of the petroleum-refining industry of the country increased 67·2 per cent. between 1909 and 1914. The total cost of the crude petroleum went up 64 per cent. The production of naphthas and lighter products, chiefly gasoline, increased from 10,806,550 barrels in 1909 to 29,200,764 barrels in 1914; while the value increased from £8,286,000 to £25,400,000. Illuminating oils show an increase in quantity from 33,495,798 barrels, valued at £19,697,000, to 38,705,496 barrels, valued at £20,168,000, or an increase of 11·7 per cent. in quantity, and of 2·4 per cent. in value. The gasoline product of the petroleum refineries does not include casing-head gasoline, condensed from natural gas at the gas wells. The total gasoline production, including the casing-head gasoline, was 24,711,565 barrels, or 1,235,578,250 gallons.

PERSONAL.

Private J. W. Atkinson, of the West Riding Regiment, a former employee at the Skipton Gas-Works, has been awarded the Military Medal at the front, for good service in attending to the wounded.

Mr. William Martin, the Secretary of the Continental Union Gas Company, is to be congratulated on having completed his fiftieth year of service, having joined the Company in 1866, at the age of 17. During this long period, he has been much engaged on the Continent at various stations of the Cie. l'Union des Gaz, in which the Continental Union are interested. At the time of the war of 1870, he was transferred, with the Paris office staff, during the siege, to Vienne, a small town near Lyons, and often had to lend a hand in the retort-house. In 1887, he came from Genoa to London, and was appointed Assistant-Secretary, being promoted to the secretaryship on the retirement of Mr. Himing in 1904. He is a finished scholar in the French and Italian languages; and his knowledge of the intricacies of Company law in the latter country is very great. In addition to an intimate knowledge of the technicalities of gas making, Mr. Martin is also well acquainted with shipping matters, having been for many years in charge of the French Company's shipping department at Genoa.

OBITUARY.

CHARLES NICKSON.

The death took place last Tuesday, at the ripe age of 87, of Mr. Charles Nickson, who no more than seven years ago retired from the position of Superintendent of the Manchester Gas Department, when he was one of the oldest officials of the Corporation. When he relinquished his duties in 1909, he had occupied the position of Superintendent for 26 years; and he was, of course, in the service of the Corporation for very many years before that. As a matter of fact, his total length of service was 65 years; and when he gave up active work, shortly after the 80th anniversary of his birth, the Gas Committee, who were anxious to retain at least part of his services, unanimously appointed him Consulting Superintendent. His first position with the Gas Department was as a collector, previous to which he was with the old Highways Board. Eloquent testimony to the esteem in which the deceased gentleman was held was provided on the occasion of his "Golden Wedding" in 1901, when handsome gifts were presented to both himself and his wife by the employees of the Gas Department. Mr. Frederick A. Price, his deputy, succeeded him in the position of Superintendent.

In the main, Mr. Nickson's work, of course, brought him more into touch with the gas consumers at Manchester than with members of the gas profession outside the Corporation; but there are many who will remember the paper dealing with the labour questions in gas-works which he read in 1891 at the Carlisle meeting of the Gas Institute. In this he gave his hearers the benefit of his experience during a strike which had a short time previously occurred at the Manchester Gas-Works. There are many, too, who will recall the zeal displayed by Mr. Nickson in looking after the comfort of the members on the occasion of the visit of the Institution of Gas Engineers to his city.

The Funeral.

The funeral took place on Friday, at the Harpurhey Cemetery, Manchester; the service being conducted by the Rev. J. E. Roberts, M.A., Pastor of the Union Baptist Chapel, which chapel Mr. Nickson attended for many years. The principal mourners were Mr. Charles Nickson (son) and Mr. C. H. Nickson (grandson). The Gas Department were represented by Mr. Fredk. A. Price (Superintendent), who also represented the Chairman (Alderman Kay, J.P.), the Deputy-Chairman (Alderman Hassall, J.P.), and the Engineer (Mr. J. G. Newbigging), all of whom were out of town. There were further present Mr. F. P. Smith (Accountant), Mr. C. E. Morton (Chief Inspector of Ordinary Meters), Mr. S. J. Bruford (Chief Inspector of Automatic Meters), and several Collectors. Mr. George Rhodes represented the Manchester Municipal Officers' Guild; and among the friends present were ex-Alderman Mainwaring, Mr. Mark Bailey, Mr. Williamson, Mr. James Robinson, and representatives of the firm of Messrs. Harold Nickson and Co.

AN APPRECIATION.

By Frederick A. Price.

The name of Charles Nickson was very familiar to the public of Manchester, as, prior to his appointment in 1883 as Superintendent of the Gas Department, he was for many years a collector of gas accounts; and in the latter capacity he always claimed that he had acquired a true and intimate knowledge of human nature. If I at any time expressed a little sympathy for a consumer who could not pay his bill, he invariably twitted me with the remark that I had never been a collector of money. "Ask a man for money, he instantly becomes an enemy," was to him an axiom.

When one is reminded that Mr. Nickson came to Manchester from a Cheshire village 72 years ago, one's mind is carried back to the times of Court leets, borough reeves, feoffees, &c.; and one can almost hear the watchman of those days crying out "Four o'clock! Cold and frosty morning!!" Mr. Nickson was exceedingly fond of speaking of old times, ancient customs, and people of a bye-gone age. The last time I visited him, he was eloquent on the "doings" of Sam Mendel, the celebrated cotton prince of Manchester, who flourished sixty or seventy years ago.

In his early life, Mr. Nickson lost no opportunity of hearing John Bright, Richard Cobden, and George Wilson speak on "Peace, Retrenchment, and Reform;" and to the last he was proud of relating that he had shaken hands with each of those giants of the Manchester School of politics. The experience he gained in attending such meetings was invaluable to him in after years. He had an intimate knowledge of the proper mode of procedure at a public meeting; and the proceedings of the Gas Committee bear testimony to his conciseness and clarity of expression in drafting minutes. He was an apt speaker, and possessed a vein of sarcasm which occasionally cropped up in a somewhat biting manner.

Although we were of totally different temperaments, my associations with Mr. Nickson were always of a pleasant character. He was honourable and straightforward, and never hesitated to "call a spade a spade." Mr. Nickson did his duty to his employers faithfully and well; and though a Radical in politics, he was a thorough-going Conservative in business, and opposed to any change. *En passant* "Calorific Value *versus* Illuminating Power" would have been a subject upon which he would have relished a full-dress debate.

Mr. Nickson was a staunch supporter of the Baptist faith, and for many years rarely missed a service at Union Chapel. He regarded the former pastor of that chapel—the world-renowned Alexander Maclaren, D.D.—as the greatest interpreter of Holy Writ.

Mr. Samuel Harrison, who died at Ripon last week, at the age of eighty, was "father" of the Lumley Moor water supply scheme for the city. He held the position of Water Manager for some time.

The death has taken place at Harrogate of Mr. John C. Nicholson, head of the firm of Messrs. John Nicholson and Sons, Limited, chemical manufacturers, of Hunslet, near Leeds. Deceased, who was 73 years of age, was formerly a member of he Leeds City Council.

It is with regret that we learn of the death at Rome on July 1 of Sig. Cav. Ing. Alfonso Pouchain, who had for nearly thirty years been connected with the Anglo-Romano Gas Company. He filled at first the position of Secretary, then that of Distribution Engineer, and finally was chief of the technical staff. He was 57 years of age.

Sergeant D. W. Carmichael, third son of Mr. J. W. Carmichael, the Engineer and Manager of the Barrhead Gas-Works, was killed in action on the 15th ult. On the outbreak of war, he enlisted as a private in the 2/9 H.L.I. Glasgow Highlanders. He was transferred to the first line, and went on active service to France on Nov. 2, 1914. He was 24 years of age. Mr. Carmichael has two other sons serving in the 2/9 H.L.I.

Lieutenant Henry Webber, J.P., of the South Lancashire Regiment, who has been killed in action in France, had been a member of the Board of the Horley District Gas Company since 1886, and Chairman since 1895. He was 68 years of age, and has three sons in the Army who are senior officers—a Colonel, a Major, and a Captain. It is stated that Lieutenant Webber, who has set so brilliant an example, went to France last May, after a very short training. He was persistent in his efforts to obtain a Commission.

Lieutenant G. V. Randall, of the East Lancashire Regiment, attached to the Royal Flying Corps, was killed in action on the 20th ult. He was attacked by six hostile machines, and two bullets struck him in the head. He fell in the British lines, about 500 yards from the German trenches. The machine was much damaged; but his observer luckily escaped with a badly sprained ankle. Lieutenant Randall was the son of Mr. W. B. Randall, the Engineer, Manager, and Secretary of the Waltham Abbey and Cheshunt Gas and Coke Company.

Lieutenant Harold Andrew, of the Manchester Regiment, who was fatally wounded in France on the 14th ult., was the only son of Mr. Arthur Andrew, the General Manager of the Oldham Gas and Water Departments. He was leading his platoon through a wood to clear it of the enemy, when a shell burst about four yards in front of him. His last words were to his men to push forward and to reach the objective which he had been told to get; and he sent them all forward except his servant, who was also wounded. Before the war, Lieutenant Andrew (who was 28 years of age) was in charge of the Oldham Gas Committee's show-rooms at the Market Hall.

Second-Lieutenant Harry Townsend, of the 53rd Brigade Machine Gun Company, is officially reported missing between July 19 and 22, in France. He is the youngest son of Mr. H. Townsend, the Managing-Director of the Wakefield Gaslight Company. Lieutenant Townsend was 26 years of age, and was the Assistant Engineer and Manager of the Wakefield Gaslight Company. His elder brother, Second-Lieutenant Charles Victor Townsend, of the 7th King's Shropshire Light Infantry, was recently reported in the "Journal" columns to have been killed in action in France. He was the Engineer and Manager of the Hereford Corporation Gas-Works.

ELECTRICITY SUPPLY MEMORANDA.

SINCE the Diesel Engine Users' Association came into being, the published abbreviated reports of the proceedings have been luxuriant in information regarding the troubles that this type of engine has introduced into central station working — troubles some of them that have shown a violence altogether incompatible with the oleaginous character of the fuel used. But a fatality or two, the maiming of employees, the blowing to pieces of an engine-room, and the disturbance of the supply of current do not appear to have caused all the engineers of other small to intermediate-sized stations that have adopted Diesels to regret their choice. The price of fuel oil is considerable just now. But this is only regarded as a temporary matter; and there is always tar oil to which to have recourse—that is, if the demand justifies the tar distillers producing it. The bad habits that Diesel engines have proved their capacity for developing, the users are, by mutual discussion and in collaboration with the makers of the engines, trying to eliminate; but there has been so much said about these bad habits, that one was beginning to wonder when, if ever, there would be something said that showed an advantageous side for the engines. The President of the Association (Mr. Geoffrey Porter) has essayed to show that they have a good side, which is in respect of the generating costs per unit, taking the price of oil at a figure approaching normal rather than the enormous ones that now obtain, and which have turned attention to tar oils. But dealing with the main part of Mr. Porter's paper, there is a point to be made regarding the production of tar oils. Mr. Porter says the question of fuel oils is one of importance to the whole electrical industry; and he is not at all content that this country should remain dependent upon other countries for supplies. The only sufficient opening for giving the country the desired independence is through the carbonization of coal; but the users of Diesel engines cannot expect that special attention will be given to their requirements in this connection, without some sort of guarantee is afforded that there will be a continuous market for the production, and that tar oils will not be thrown over directly imported fuel oils are again so plentiful that the price is reduced to a purchasable level. This is a matter that the Association should investigate, and see what can be done to encourage a permanent supply of home-produced oils of the character required by users of the engines.

Tar-Oils for Engine Use.

But to the main part of the paper. Mr. Porter sets up the Diesel engine as being the saviour of many an electricity supply station; and truly several such stations have sadly stood, and still stand, in need of something to rescue them, even under excellent fuel-purchasing conditions. The author makes no attempt to hide the fact of the existence of a large number of these stations. There are, he says, "dozens" of inefficient steam-equipped stations dotted about the country from ten to twenty years old, "none of them with any great future, so far as can be seen at present, and most of them having difficulty to make both ends meet financially." "Dozens" may mean anything. It is a very convenient measure of quantity when it is desired to be equivocal. And only "ten to twenty years old"! Every one of these stations started with prognostications as to a wonderfully lucrative career; and ten to twenty years later saw them struggling with adversity, and the hope of a brilliant future completely vanished. There are also numerous other stations that, if a fair allowance for sinking fund were made annually, and depreciation, obsolescence, and special contingencies provided for by solid cash reserves (with investment in readily negotiable securities), would show they were not the financial successes that in print has been declared to be the case. When Mr. Fedden, of Sheffield, makes the confession that he has recently done [see last week's "Memoranda"] as to the financial position of an undertaking of the rank of the one of which he has technical and commercial charge, then there are not a few others that likewise would not stand the test that he has applied to that concern.

Financially Unsound Stations.

However, Mr. Porter comes along with his paper, in which he endeavours to advance proof that many of the smaller inefficient steam-driven stations can pass from that state to one of greater efficiency by the installation of the Diesel engine, running it as regularly as possible, and only using the inefficient steam plant for peak loads, and when the Diesel plant misbehaves itself, or is down for cleaning or repair. In fact, the author goes so far as to say that had it not been for Diesel engines many stations would be in a bankrupt condition to-day. But it must not be taken that Mr. Porter's statement is conclusive in respect of an over-all economy for the Diesel engine in all cases. Much depends on circumstances; but his comparisons, within the limits of the illustrations taken, do show that concerns burdened with steam plant which is terribly inefficient compared with the efficiency of modern steam-turbine generating plant on adopting Diesel plant, with the cost of fuel oil much below current market values, have very distinctly altered the complexion of their gross profits. His data show that Diesel engines require a greater capital expenditure per unit of generating power than does an equipment of modern steam plant; but heavier capital expenditure does not matter at all, if it produces economy, and a larger profit. Initial costs of plant, of course, depend largely on local circumstances and the state of the markets at the time of installation; and in considering Mr. Porter's figures which do not confirm the general statement as to the heavier Diesel capital costs per kilowatt, it must be remembered that, so far as they refer to steam plant, they are the product of installation years ago, of piecemeal extension, and of inefficiency. His principal data are drawn from three cases. The first is a station "A" (1048 KW., direct current). The Diesel plant in this instance is equal to 510 KW. It cost £9248, or £18·13 per KW. But the steam plant, which is equal to 538 KW., cost (engines, boilers, accessories, and foundations all included) £15,698, or £29·1 per KW. In the case of station "B" (3700 KW., direct current), the Diesel plant is equal to 600 KW. It cost £16,000, or £26·7 per KW. The steam plant, which is equal to 3100 KW., cost £87,100, or £28 per KW. But station "C" is a very bad example in respect of steam plant. This is a station of 1400 KW., alternating current. The Diesel plant is equal to 540 KW. Its cost was £10,233, or £18·66 per KW. The steam plant is equal to 860 KW.; and the cost was £34,292, or £39·8 per KW.

Diesel Engines to the Rescue.

How the Diesel engines have reduced the costs per unit generated are seen from a tabulated statement; but the prices taken for coal are rather high, while the price of oil is nothing like the cost of to-day. In the case of station "A," the average price of oil is taken at 64s. per ton, while the average price of coal is put at 29s. 8d. per ton. The number of units generated per ton of coal was only 176; while the units generated per ton of oil were 3200. The consumption of coal per unit was the extravagant one of 12·8 lbs., and of fuel oil 0·67 lb. But generating only 11,312 units by the steam plant out of a total of 602,896 units, the cost of fuel for the combined plant was 0·296d. per unit generated, as compared with 0·570d. in the last completed financial year before starting the Diesel engines. Taking station "B," the price of oil was 67s. 2d. per ton, and of coal 30s. 9d. The number of units generated per ton of coal was 553; and by oil 3615. The consumption of coal per unit was 4·05 lbs., and of oil 0·62 lb. The units generated by the Diesel plant numbered 2,429,148, and by the steam plant 2,133,214. In this case, the average cost of fuel (combined coal and oil) was 0·459d. per KW., as compared with 0·537d. for coal alone the year before the Diesel engines were introduced. Then as to station "C," the price of oil was 65s. per ton, and of coal 17s. The units generated per ton of coal make the poor showing of 159, and per ton of oil 2435. The coal expenditure per unit is a terribly wasteful one, 14·9 lbs., and that of oil 0·92 lb. The working here, one would suggest, requires very serious overhauling. In this case, the number of units generated by the Diesel plant was 1,127,557, and by the steam plant 403,431 units. The combined cost of fuel per unit was 0·594d. (oil 0·32d. and coal 1·36d.), as compared with 0·869d. per unit the last completed financial year before starting the Diesel engines. On Mr. Porter's figures standing alone (without reference to knowledge as to results elsewhere), one cannot form any comparison as to the working of Diesel plants compared with really efficient modern steam plant; for, in at least two of the cases, the inefficiency of the steam plants is of a very gross character. Naturally, where such inefficient steam plant exists, it is wise to run the Diesel plant, given reasonable fuel costs, for "all it is worth," and to keep the steam plant for peak loads, and general stand-by purposes. It can also be seen, too, that the lower cost of operating a Diesel engine compared with an extravagant steam plant would soon wipe out any extra capital costs. Taking the whole of the generating costs of the three stations, the reductions per unit since adopting Diesel engines are: Station "A" 0·358d., station "B" 0·046d., and station "C" 0·276d. There has also been good advance in the thermal efficiency of the stations; the thermal efficiency being arrived at by calculating the B.Th.U. equivalent to the units generated at the dynamo terminals, and working out the total as a percentage of the B.Th.U. in the quantity of fuel consumed. The thermal efficiency of station "A" rose from 4·93 per cent. to 22·6 per cent. on the adoption of the Diesel plant; station "B" from 6·1 to 10·5 per cent.; and station "C" from 2·6 to 6·5 per cent. There are thermal efficiency differences between the stations which speak volumes.

Other Data.

The other week we gave some particulars from "Electrical Engineering" as to the results of inquiries our contemporary made regarding the effect of daylight saving on the output curves of various electricity supply stations. Since then it has published further information. It mentions Birmingham, which city is very busy with munitions work. It appears that there, comparing two days, a reduction took place in the demand between 8 and 11 p.m., and an increase from 11 p.m. to 1 a.m. on May 22 contrasted with May 15; and this amounts to approximately 1000 KW. As the units supplied for light now represent only about 10 per cent. of the total output, and as the reduced demand between 8 and 11 p.m. is to some extent met by the increased demand after 11 p.m., it cannot be said (remarks our contemporary) that the Birmingham undertaking has been affected to any appreciable extent by the Summer Time Act. This bears out, more or less, the experience of a number of other towns similarly circumstanced as Birmingham. At

Effect of Daylight Saving.

Nottingham, a manufacturing town of a rather different character, there has been a big falling-off in output. At Sunderland, any effect of the Act on the total load has been obliterated by an increase in power load, because the total output is greater since the Act came into operation. Serious results are predicted at St. Pancras, where the reduction in revenue is put at no less than £7000 per annum, and at Bristol the reduction in revenue is expected to be about £2000. At Cardiff, it appears that there has been a drop in the load on the single phase system (which is principally lighting) of 11½ per cent. due to the restricted lighting order, and of 8½ per cent. due to the Daylight Saving Act.

Co-Operative Publicity.

We cannot help thinking that Mr. A. G. Greenly, who recently contributed an article to the "Electrical Times" on "Co-Operative Effort in Publicity," has been closely studying the work of the British Commercial Gas Association. If he has not, then it simply shows how one great mind has unconsciously hit upon the, in some respects, actual practices of other great minds. Mr. Greenly points out that theoretically a co-operative advertising campaign is simple. Yet those who have tried to promote such a scheme know how complex it really is. This has been the experience of the "B.C.G.A." Then our friend wisely remarks that "if there is to be efficient co-operation, the smallest units in the Association must know as much about the business transactions as the central body. In matters of policy, the units should have full responsibility." By wide representation and circulated information, the subscribers of the "B.C.G.A." have both full responsibility and knowledge as to what is being done. Advice and assistance in all matters affecting gas development are given from the central body as and when desired. Though an advertising man, Mr. Greenly feels that "a large proportion of the money available should be used for removing obstacles rather than for endeavouring to sell electricity and electrical appliances in the face of such obstacles." He favours the appointment of a whole-time specialist in publicity work. The "B.C.G.A." have an organized staff of specialists, and a member of it is an experienced gas sales manager. He also advises the appointment of a duly qualified journalist of the masculine gender. Well, the "B.C.G.A." have a skilled journalist who will always insist on not being called the "editress" but the "editor." However, Mr. Greenly places a feather in her hat when he says that "the use of clever, inspired editorials by the gas interests have hitherto been adverse to the interests of our industry." How does he come to know that "editorials," however clever, have been inspired? But why "adverse" to the electricity industry? Is it then not true that electricity for light, heat, and power is cheaper than gas, that meat cooked in electric-ovens refuses to part with its material components to the same extent that meat is electrically supposed to do cooked at the same temperature in a properly designed and used gas-oven, that water can be boiled as quickly by electricity as by gas, and that rooms can be heated more promptly by electricity than by gas? If true, experience must ride superior to inspired editorials, however clever they may be.

[CORRECTION. — In the paragraph on "Loans and Coal Economy" in last week's "Memoranda," the reference to the coal consumption per unit generated with modern plant at Stoke appeared, through a typographical error, as 23 lbs. instead of 2¾ lbs. In a previous allusion to the subject—on June 13—the correct figure appeared; so that we do not suppose anyone interested has been misled.]

Electro-Magnetic Separators for Monazite Sand.

An account is given in the "American Gaslight Journal," by Mr. Reginald Gordon, of the introduction of electro-magnetic separators for extracting the monazite from the sands in the Brazilian fields, which he says has resulted in a considerably increased output, both as to quality and quantity. Machinery is also being substituted for human labour for excavating at the deposits; and it is likely that this practice will become more general in the future, with a further reduction in the cost of the output. Already, since 1894, the price of thorium nitrate has fallen from 2000 frs. per kilogramme to 28·75 frs. in July, 1915. The writer of the article calculates that 300 million gas-mantles are consumed each year. The world's annual consumption of monazite is thus estimated at about 3500 tons. In the past, considerable quantities were produced in North and South Carolina; but, due principally to the small average percentage of monazite in the sands, lack of transportation facilities, and inefficient working methods, these fields could not compete successfully with the foreign ones, and have been generally abandoned.

The Midland Association Meeting.—By inadvertence, in our report in last week's issue of the proceedings at the meeting of the Midland Association of Gas Managers at Etruria mention was not made of the services of Mr. J. Warrillow, the Assistant to Mr. H. E. Copp, the Engineer of the works. The explanations that Mr. Warrillow was able to give as to the working of the toluol plant and the general arrangement of the works visited were much appreciated by the members.

THE GAS LIGHT AND COKE COMPANY.

Half-Yearly Report.

THE following is the report of the Directors of the Gas Light and Coke Company for the half year ended the 30th of June, which, with the accounts [some particulars from which are given below], will be presented at the ordinary meeting on Friday.

The Directors have to record with the greatest regret the death of the Governor of the Company, Sir Corbet Woodall, who had been a Director since August, 1897, and was Governor for the last ten years.

The Directors have elected Mr. John Miles to succeed the late Sir Corbet Woodall as Governor; and Mr. Herbert Jameson Waterlow has been elected to fill the place of Mr. Miles as Deputy-Governor. The vacancy created on the Board by the death of Sir Corbet Woodall has been filled by the election of Mr. David Milne Watson, who has been General Manager of the Company since 1903. The Directors have appointed Mr. D. Milne Watson to the position of Managing-Director.

The Directors also deeply regret that they have to record the death of Sir Hugh Owen, G.C.B., which occurred just before the last general meeting, and after the half-yearly report had been issued. Sir Hugh Owen had been a Director for fourteen years. His place was filled by the election of the Right Honourable Sir Daniel Ford Goddard, P.C., M.P., to a seat at the Court.

The accounts for the past half year show that, after providing for fixed charges, and setting aside £5000 towards the redemption fund, there remains a profit balance of £376,484 7s. The amount brought forward from the previous half year being £446,614 19s. 11d., there is a total available balance of £823,099 6s. 11d., out of which the Directors recommend the payment of a dividend on the ordinary stock at the rate of £4 4s. per cent. per annum, which will absorb £342,582 0s. 7d. The sum to be carried forward to the credit of the current half year is £480,512 6s. 4d.

The sales of gas for the half year show an increase of nearly 2 per cent. compared with the quantity sold during the corresponding period of 1915.

There has been an increase during the six months of 4575 in the number of consumers, and of 18,097 in the number of gas-stoves sold and let on hire.

The Directors have to report that contracts for the supply of coal to the Company during the twelve months commencing July 1 have now been made. This has been a matter of considerable difficulty, and thanks are due to the Board of Trade for their assistance. The prices arranged show a considerable increase over last year. The market for residuals continues good.

The rates of freight continue very high, and boats are difficult to charter. The Directors have accordingly increased the Company's fleet by the purchase of several steamers.

The Company has renewed contracts for the necessary quantities of oil. The prices are very high, due almost entirely to the rates of freight.

The number of the Company's employees with the Colours is now upwards of 3000. The Directors greatly deplore the casualties which have occurred.

The Court of Directors has been furnished by the several Engineers of the manufacturing and distributing departments with certificates that all the Company's works and plant have been maintained in thorough efficiency.

JOHN MILES, *Governor.*

Horseferry Road, Westminster, S.W., July 20, 1916.

The Accounts.

The accounts accompanying the report consist of the usual statements.

The statement of capital (stock) sets forth that the total paid-up is £10,413,480; added on conversion, £12,832,955—total amount authorized, £23,246,435. Deducting the amount redeemed, £270,770, the total amount of the Company's existing capital powers is £22,975,665. The statement of loan capital stands thus: Total paid up, £3,186,660; added on conversion, £1,618,190; unissued, £750,000—total amount authorized, £5,554,850.

The capital account shows receipts (with premiums, £1,688,957 14s. 8d.) to the amount of £29,469,472 14s. 8d. The expenditure is shown in the following items:—

Expenditure to Dec. 31, 1915			£14,768,122 2 1
Expenditure during the half year to June 30, 1916—viz.:—			
re Land	£508 0 6		
Buildings and machinery in extension of works	42,049 1 1		
New and additional mains and service-pipes	6,646 18 8		
Do. do. meters	11,742 9 5		
Do. do. stoves	25,654 9 8		
		86,600 19 4	
			£14,854,723 1 5
By depreciation of plant	£2,548 11 2		
„ depreciation of meters and stoves	63,891 10 6		
		66,440 1 8	
Total expenditure			£14,788,282 19 9
Nominal amount added on conversion			14,451,145 0 0
			£29,239,427 19 9
Deduct amount of capital redeemed under Company's Act of 1903:			
Previous account	£257,015 0 0		
This half year	13,755 0 0		
		270,770 0 0	
			£28,968,657 19 9
Balance ot capital account			500,814 14 11
			£29,469,472 14 8

The total of the net revenue account is £1,043,115 3s. 6d., compared with £1,014,578 on June 30, 1915. The balance applicable to the redemption fund and to dividend on the ordinary stock is £828,099 6s. 11d.; and the following statement shows how it is proposed to appropriate it:—

June, 1915.			
£384,538	..	Net balance brought from last account	£446,614 19 11
400,051	..	Net revenue for the half year	381,484 7 0
£784,589			£828,099 6 11
5,000	..	Contribution to redemption fund	5,000 0 0
£779,589			£823,099 6 11
(£4 4s. 0d. p. ct.)		Dividend on the ordinary stock—	
£343,501	..	£4 4s. per cent. per annum on £16,313,430	342,582 0 7
29	..	Forfeiture for deficiency in illuminating power	
		,, ,, calorific ,,	5 0 0
£436,059	..	Balance carried to next half-year's account	£480,512 6 4

The three statements relating to the reserve, special purposes, and depreciation funds stood as follows on June 30: Reserve fund, £76,984; special purposes fund, £326,981; depreciation fund, £82,527.

The following is the revenue account:

Expenditure.

June Half Year, 1915.		£ s. d.	£ s. d.
	Manufacture of gas—		
£713,215	Coal, including all expenses thereon	1,105,886 0 11	
101,235	Oil ,, less value of oil tar	1 2,766 2 1	
67,385	Coke and breeze used in the manufacture of carburetted water gas	66,146 18 1	
15,575	Salaries of engineers and other officers at works	16,914 9 0	
88,637	Wages	111,631 6 3	
12,905	Purification	13,152 13 6	
240,200	Repair and maintenance of works and plant, materials and labour, less received for old materials, £7453 14s. 9d.	296,981 9 10	
	Distribution of gas—		1,723,479 0 6
61,547	Salaries and wages of officers (including rental clerks)	65,300 10 0	
90,014	Repair and maintenance of mains and service-pipes, &c.	109,812 8 8	
89,440	Repair and renewal of meters	102,102 0 10	
97,975	,, ,, stoves	112,463 9 9	
13,364	Gas-fittings, including labour (automatic meter supplies)	14,279 8 2	
			403,957 17 5
25,971	Public lamps—lighting and repairing	..	28,880 1 5
	Rents, rates, and taxes—		
7,175	Rents payable	7,446 13 3	
168,301	Rates and taxes	159,757 5 9	
			167,203 19 0
	Management—		
3,750	Directors' allowance	3,750 0 0	
302	Company's Auditors and Assistant	304 4 0	
9,427	Salaries of General Manager, Secretary, Accountant, and clerks	10,166 9 0	
28,681	Collectors and cashiers	31,015 15 8	
4,673	Stationery and printing	6,762 1 1	
6,112	General charges	6,776 2 4	
			58,774 12 1
	Co-partnership, for twelve months to June 30, 1916	9,247 6 2	
12,953	Less on Account	4,600 0 0	4,647 6 2
50	Parliamentary charges	..	50 16 0
554	Law charges	..	441 1 4
1,050	Charges *re* Quinquennial re-valuations	..	19 12 10
7,012	Bad debts	..	5,227 7 5
500	Depreciation fund for works on leasehold lands	..	500 0 0
27,439	Annuities to officers and workmen, including contribution to officers' superannuation fund	..	27,166 2 6
7,136	Allowances to employees on Active Service	..	7,277 11 11
1,497	Workmen's compensation	..	2,792 1 6
3,833	Company's Contribution under National Insurance Act, 1911	..	3,951 8 2
	Public officers—		
1,258	Gas Referees and Official Auditor	1,252 17 4	
568	Public testing stations	649 1 5	
			1,901 18 9
1,909,184			2,436,272 17 0
630,040	Balance carried to net revenue account		596,500 3 7
2,539,224			3,032,773 0 7

Revenue.

June Half Year, 1915.		£ s. d.	£ s. d.
	Sale of gas—		
£1,805,640	Per meter at 3s. and 2s. 10d. per 1000 cubic feet	1,963,740 10 2	
49,104	Public lighting and under contracts	48,894 3 3	
1,854,744			2,018,634 13 5
76,277	Rental of meters	..	77,566 19 7
77,585	Rental of stoves	..	81,632 17 2
85,123	Rental of fittings	..	89,937 12 3
	Residual products—		
2 4,981	Coke, less labour, &c.	445,352 17 10	
31,512	Breeze, less ,, ,,	32,547 13 9	
71,094	Tar and tar products	134,163 6 9	
81,862	Ammoniacal liquor and sulphate of ammonia	148,143 0 9	
439,449			758,206 19 1
5,831	Rents receivable		6,554 13 1
215	Transfer fees		239 6 0
2,539,224			3,032,773 0 7

Statement of Coal.

—	In Store Dec. 31, 1915.	Received During Half Year.	Carbonized During Half Year.	Used During Half Year.	In Store June 30, 1916.
	Tons.	Tons.	Tons.	Tons.	Tons.
Coal	267,772	784,402	897,689*	1909	152,576

* In addition to this quantity of coal, 7,246,587 gallons of oil have been used during the half year.

Statement of Residual Products.

Description.	In Store, Dec. 31, 1915.	Made During Half Year.	Used During Half Year.	Sold During Half Year.	In Store June 30, 1916.
Coke—tons	50,682	551,300	113,695	474,071	14,216
Breeze—tons	21,103	124,667	18,044	105,366	22,360
Tar, from coal only—galls.	2,068,693	8,824,994	8,307,050	421,727	2,164,910
Ammoniacal liquor—butts	28,689	236,375	243,413	..	21,651

Statement of Gas Made, Sold, &c.

Quantity Made.	Quantity Sold.		Total Quantity Accounted for.	Number of Public Lamps.
	Public Lights and Under Contracts (Estimated).	Private Lights (per Meter).		
Thousands.	Thousands.	Thousands.	Thousands.	
*14,885,868	246,727	13,467,517	13,919,491	44,604
†14,411,622	284,639	13,169,114	13,630,560	44,766

* Including 3,455,360,000 cubic feet of carburetted water gas. † June half year, 1915.

The remaining statement is the balance-sheet, which gives the value of the stores on hand at the close of the half year as follows: Coal, £187,859; gas oil, £110,156; coke, £10,662; tar and ammoniacal liquor and products, £123,308; and sundries, £474,953. The figures this time last year were: Coal, £165,952; gas oil, £41,958; coke, £6988; tar, ammoniacal liquor, and products, £96,663; sundries, £384,478.

SULPHATE PRICES FOR HOME USE.

Mr. D. Milne Watson, the Chairman of the Sulphate of Ammonia Association, forwards for publication the following extract from the letter which was sent out to all makers of sulphate of ammonia as a result of a meeting of the Association held on the 25th ult. to which all producers, both members and non-members of the Association, were invited.

SULPHATE OF AMMONIA ASSOCIATION,

84, Horseferry Road, S.W., July 26, 1916.

Prices for Sales for Home Use.

At a general meeting of sulphate of ammonia manufacturers, members and non-members of this Association, held on the 25th inst., the Rt. Hon. F. D. Acland, M.P., Parliamentary Secretary to the Board of Agriculture, gave an address, strongly emphasizing the necessity from the national point of view of giving every encouragement to corn and manure merchants and manure mixers to sell, and to farmers to buy, sulphate of ammonia next season.

The meeting, at which manufacturers representing a production of nearly 200,000 tons per annum were present, unanimously decided to fix the following prices for home sales during the coming autumn and spring seasons for 24½ per cent. quality, f.o.r. at makers' works, in makers' bags free:

To manure mixers, corn and manure merchants 15s. per cwt. net, cash.

To farmers, 15s. 6d. per cwt. net, cash. (3d. per cwt. to be allowed if buyers supply bags).

It was further resolved that, in order to encourage merchants and farmers to take early delivery, the following specially reduced prices should be fixed for quantities removed from sellers' works during the period Aug. 1 to Sept. 30, 1916.

To manure mixers, corn and manure merchants, 14s. 6d. per cwt. net, cash.

To farmers, 15s. per cwt. net, cash,

a condition of these sales being that quantities exceeding 15 tons be taken in equal monthly deliveries during August and September.

It is earnestly hoped that all manufacturers of sulphate of ammonia will agree to reserve a percentage of their make, and to sell it at the above-mentioned prices. If this policy is loyally carried out by manufacturers, we have good reason to hope that no steps will be taken to bring about an artificial reduction in the price, and that we shall be allowed to export the balance of our production not required for home use.

We trust that manufacturers will make every effort to sell as much as possible for home consumption before Christmas, in order to relieve the pressure in the spring, and to provide a continuous outlet, so that the works do not become over-stocked. If supplies are freely offered and obtainable at the above prices, there is not likely to be interference with export.

SOUTH METROPOLITAN GAS COMPANY.

The Directors' Report and the Accounts.

THE following is the report of the Directors of the South Metropolitan Company for the six months ended the 30th of June, which, with the accounts (an abstract of which appears below), will be presented to the proprietors at the half-yearly meeting to-morrow week.

The result of the half-year's working shows an increase of £21,748 in the amount to be carried forward after providing for payment of the sliding-scale dividend at the rate of £4 8s. per cent. per annum, and strengthening the insurance fund—which was seriously depleted by the coal strike—by £20,000.

It was pointed out a year ago that one of the causes necessitating an increase in the price charged for gas was the high freightage of coal, and that the remedy was the acquisition of steamships. This course has been followed; and the saving in this connection will allow a reduction of 2d. per 1000 cubic feet—*i.e.*, from 2s. 10d. to 2s. 8d.—in the price charged to consumers from Midsummer. At the lower figure, the sliding-scale will restore to the extent of 5s. 4d. per cent. per annum the large fall in dividend which took place at the time.

The consumption of gas has been practically the same as during the corresponding period of 1915. This must be considered satisfactory, having regard to the enforced reduction in the hours of lighting. The effects of daylight saving have been compensated by the heavier demands due to increased industrial activity.

The improvement in the value of residuals has been maintained; a result to be expected when the high cost of coal is taken into account.

The Company's Bill in Parliament has now received the Royal Assent. The present need for money does not appear great; but much of this apparent improvement over the last balance-sheet arises from the fact that smaller quantities of coal and other materials are in store. The Board are asking the authority of the shareholders to issue, as and when it may be considered advisable, the stock empowered to be raised by the Act.

Relief from the trouble of labour shortage has been obtained in many departments by the employment of women, and with promising results. The co-partnership continues its work in maintaining the identity of interest between the Company and its staff.

The Directors regret to record the death of Mr. Laurence Rostron, who joined the Board in November, 1911. Mr. Rostron always had at heart the interests of gas supply and labour co-partnership; and his loss is a real one. Mr. E. Honoratus Lloyd, K.C., has notified his candidature for the vacancy thus arising.

CHARLES CARPENTER, *Chairman.*

709, *Old Kent Road, S.E., July* 26, 1916.

The Accounts.

The following are the principal portions of the accounts accompanying the preceding report.

The first two statements relate, as usual, to the stock and loan capital. The former sets forth that the standard rate of 4 per cent. is payable on £6,011,224 and £598,671 (Act of 1901) of stock; while the latter shows that the loan capital, the rate of interest on which is 3 per cent., amounts to £1,798,994 and £96,451 (Act of 1901). The third statement is the capital account. It stands as follows: Amount received, £5,476,420; nominal amount added by conversion (less premium), £3,028,920—total, £8,505,340. The items of expenditure are as follows:

Capital account to Dec. 31, 1915			£5,258,747 11 0
Expenditure during half year to June 30, 1916—viz.:			
New buildings and machinery	£35,625 0 0		
New and additional mains and services	2,216 15 1		
New and additional meters	1,205 9 11		
New and additional stoves	1,792 4 3		
		40,8 9 9 3	
Total expenditure			£5,299,577 0 3
Balance			176,842 19 9
			£5,476,420 0 0
Nominal amount added by conversion, less premium			3,028,920 0 0
Total			£8,505,340 0 0

The net revenue account shows a sum of £191,134 1s. 9d. applicable to dividend on the ordinary stock. Following this are the statements relating to the reserve, renewal, and insurance funds. They show that the balances on June 30 were as follows: Reserve fund, £199,379 0s. 11d.; renewal fund, £24,151 12s. 1d.; insurance fund, £57,369 5s. 10d.

The following is the revenue account.

REVENUE ACCOUNT—*Expenditure.*

Manufacture of gas—			
Coal into store, including £3332 14s. 3d. for London Port and tonnage dues	£693,824 9 6		
Purification	19,125 14 0		
Salaries of Engineer and Officers at works	20,467 4 1		
Wages (carbonizing)	53,509 0 3		
Repairs and maintenance of works and plant, less £4511 5s. 5d. received for old materials	138,166 7 10		
		£925,092 15 8	
Co-partnership for twelve months to June 30, 1916	14,826 13 9		
Less on Account	7,000 0 0		
		7,826 13 9	
Distribution of gas—			
Repair, maintenance, and renewal of mains and service-pipes	£32,729 6 4		
Salaries and wages of officers, including rental clerks	23,103 10 0		
Repair and renewals of meters	39,026 10 2		
Repair and renewals of stoves	41,371 5 11		
Repair and renewals of gas-fittings	42,631 14 1		
		178,862 6 6	
Public lamps, labour and materials £15,001 12s. 9d., less £12,898 5s. 9d. received for the same		2,103 7 0	
Rents, rates, and taxes—			
Rents payable	£1,562 17 11		
Rates and taxes	55,957 4 5		
		57,520 2 4	
Management—			
Directors' allowance	£2,894 0 10		
Salaries of Secretary, Accountant, and clerks	3,631 4 5		
Collectors { Ordinary	5,800 4 6		
Collectors { Slot meter	11,980 1 2		
Stationery and printing	3,330 13 3		
General charges	13,984 0 10		
Company's Auditors	112 10 0		
		41,734 15 0	
Miscellaneous—			
Law charges		425 5 5	
Parliamentary charges		543 11 8	
Bad debts		1,533 14 9	
Stolen from 632 slot meters broken open		130 7 10	
Superannuation, sick, and accident funds		17,162 3 8	
National Insurance Act charges		2,790 16 9	
Gas Referees and Official Auditor		245 4 4	
Leasehold renewal fund		1,000 0 0	
War Bonus and War fund		43,461 0 8	
Total expenditure		£1,280,432 5 4	
Balance carried to net revenue account		230,179 9 1	
		£1,510,611 14 5	

Receipts.

Sale of gas—			
Lady Day, at 2s. 10d. per 1000 feet	£521,489 0 11		
Midsummer, at 2s. 10d. per 1000 feet	386,429 9 5		
	£907,918 10 4		
Public lighting	13,409 12 4		
		921,328 2 8	
Meters at rent	£43,680 18 11		
Stoves and fires at rent	39,231 4 1		
Gas-fittings at rent	49,578 1 11		
		132,490 4 11	
Residual products—			
Coke, less labour and cartage	£296,014 6 4		
Breeze, " "	1,558 9 10		
Tar and tar products, less labour	80,142 4 4		
Sulphate of ammonia " "	77,736 4 9		
		455,451 5 3	
Rents receivable		1,272 1 7	
Transfer fees		70 0 0	
Total receipts		£1,510,611 14 5	

Total amount paid in salaries for half year, £45,943 2s. 8d.
" " " wages " £318,387 19s. 1d.

Statement of Coal.

In Store Dec. 31, 1915.	Received During Half Year.	Carbonized During Half Year.	Used During Half Year.	In Store June 30, 1916.
Tons. 227,200	Tons. 471,721	Tons. 569,029	Tons. 1376	Tons. 128,516

Statement of Gas Made, Sold, &c.

Quantity Made.	Quantity Sold.		Total Quantity Accounted for.	Number of Public Lamps.
	Public Lights (estimated).	Private Lights (per Meter).		
Thousands. 6,969,806	Thousands. 109,323	Thousands. 6,564,966	Thousands. 6,779,899	24,863

Statement of Residual Products.

Description.	In Store Dec. 31, 1915.	Made During Half Year.	Used During Half Year.	Sold During Half Year.	In Store June 30, 1916.
Coke—tons	54,126	352,421	87,146	309,674	9,727
Breeze—tons	35,696	64,216	30,597	46,301	23,014
Tar—gallons	624,405	5,758,777	5,781,289	406	601,487
Ammoniacal liquor—butts	9,820	216,833	216,640	..	10,013

The remaining statement is the balance-sheet, which gives the value of the stores in hand at the close of the half year as follows: Coal, £149,255; coke and breeze, £14,570; tar, ammonia, and products, £132,365; and sundry plant and stores, £249,352. The figures this time last year were: Coal, £149,608; coke and breeze, £35,677; tar, ammonia, and products, £65,909; and sundry plant and stores, £351,651. A sum of £70,223, co-partnership bonuses and savings, has been deposited with the Company; and the total of the superannuation and guarantee funds is £103,859. The figures last year were £88,606 and £80,245.

Commercial Motors Used by London Gas Companies.—An illustrated summary appears in the current number of the "Commercial Motor" of the services which are being rendered by motors of different types to the Croydon, Tottenham, and Wandsworth Gas Companies. Similar particulars with regard to the Gas Light and Coke Company and the South Metropolitan Gas Company are promised on an early date. The facts and figures quoted are deserving of earnest consideration by the administrators of other gas undertakings.

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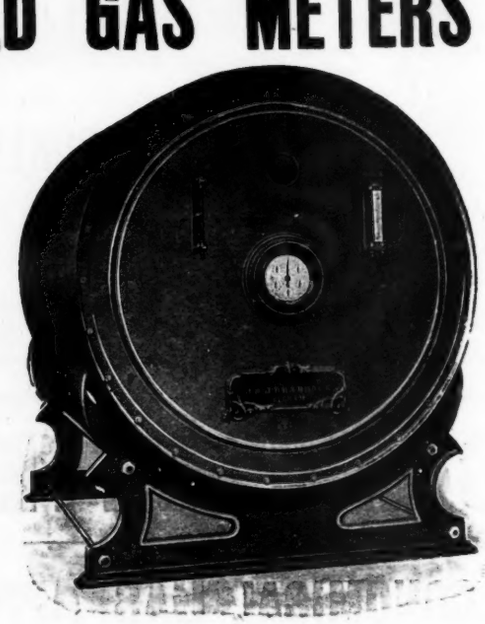

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THE DREAM OF SIR WILLIAM RAMSAY.

A MAN of marvellous capacity, a fine experimentalist, a great discoverer, one whose life was spent in the higher realms of science, but withal modest, unassuming, and with a tender and kind disposition—Sir William Ramsay is no more; but his work lives, and much of it is the genesis of knowledge the potentialities of which we cannot foresee. But even men with great minds and of vast intellectual capacity have their dreams. Sir William Ramsay once dreamed, and his dream went further than those of other men—some recognized as great, some of less repute, and others visionaries. It has been the dream of many to put down at the coal pit mouth large carbonizing plants, generate gas, recover the other products, and distribute over the country the gas at high pressures, or utilize it to generate electricity to be transmitted like the gas for the service of man here, there, and everywhere. The technical considerations did not worry them, nor the commercial ones as to whether it would be cheaper to transport the crude material (with its concentrated value) about the country, or go to tremendous expense in distribution systems passing to populated centres through vast expanses of unpeopled country where no use would be found for the gas or electricity, with coke and the other products still to be conveyed by train, barge, or ship—the coke occupying much more space per ton than coal.

Sir William's dream went further. He had a vision of sinking ing boreholes into the earth, and distilling the seams of coal *in situ*, bringing the gases to the surface, there utilizing it for the generation of electricity for traction, power, lighting, and heating, at a fraction of the present cost. It was a big dream worthy of a lively imagination. But as to the practical details, never a word. Sir William spoke of this dream at a function at which the writer was present more than four years ago. When asked how he proposed to treat the coal down in the seams, he smiled, and confessed that he himself did not precisely know. Sir William was not the actual originator of the idea of gasifying unmined coal. Mr. Anson Gardner Betts, of Troy (N.Y.), took out a patent in 1909, contemplating precisely the same thing [see "JOURNAL" for April 9, 1912]; but the scheme has remained a paper one. However, the great worker, and in this case dreamer, did not say how he intended to supply coke—so essential for industrial and other purposes—and the absolutely requisite raw secondary products to chemical manufacturers. Many industries were evidently to be discontinued, the world impoverished for certain necessaries, and no end of heat units were to be lost in converting the coal to electrical energy. But if the scheme contemplated raising coke and liquid products to the surface, then, from the points of view of weight, bulk, economy and practicability, better to bring the coal as now to daylight, and treat it at the surface—at concentrated or distributed places. There were to be no coal miners' strikes then; and if this country had had no more secondary products of coal carbonization, then the present war, through the lack of high explosives in this and certain other countries, would never have been fought to a finish. Germany would have simply annihilated all our defensive forces. Sir William had a mine offered to him for the purpose of making an experiment. It was stated in the newspapers that he had accepted the offer; but after the report we still carbonize coal at gas-works, and extensions have continued in normal times. Ships and railway trucks have since been constructed for the conveyance of coal. Tar distilleries and chemical works have been extended for dealing with the liquid products of coal carbonization. More plants for the generation of electricity have been built far from the coal-fields. The dream has not materialized. But it was the vision of a great mind.

CITY AND GUILDS EXAMINATIONS PROGRAMME.

WHILE just completing the collection from different sources throughout the country of the names of successful candidates in the last City and Guilds of London examinations in "Gas Engineering," "Gas Supply," and "Gas-Fitting," there is to hand a copy of the Institute's Programme for the Session 1916-17. This, of course, contains a great deal of information for both teachers and pupils, though on the present occasion it must be studied in the light of the official intimation made, that it may be necessary, owing to the war, materially to alter the programme, or suspend it entirely. However, the registration of classes and all other regulations must be observed unless notice to the contrary has been received. Copies of the programme (price 9d. net, postage extra) may be obtained from Mr. John Murray, of Albemarle Street, W.; and the report on the work of the Department of Technology for the preceding session, in which appear the question papers and the examiners' reports, may similarly be had, at the like price.

The dates fixed for examinations next year in which "JOURNAL" readers are more closely interested are: "Coal Tar Distillation and Intermediate Products" (written), Thursday, May 3; final (practical), Saturday, May 5. "Coal-Tar Colouring Matters" (written), Thursday, May 3; final (practical), Saturday, May 5. "Gas Engineering," Saturday, April 28. "Gas Supply," Saturday, May 5. "Gas-Fitting" (written), Monday, April 30; grade II. and final (practical), Saturday, May 5. It may be noted that in "Gas-Fitting" the practical examinations will on this occasion be held after the written examinations. The syllabus, too, has been revised.

The following are the Acting Examiners in the subjects named: "Coal-Tar Distillation and Coal-Tar Products," Mr. W. H. Coleman and Dr. J. C. Cain; "Gas Engineering," Mr. Samuel Glover; "Gas Supply," Mr. Walter Hole; and "Gas-Fitting," Mr. Henry Kendrick and Mr. Ralph Halkett. A list of qualified teachers in technological subjects is included in the book, and also particulars of special prizes offered by different bodies. Again the Society of British Gas Industries offer prizes of £3 3s. and £2 2s. to the first and second candidates respectively at the final examinations in "Gas Engineering," "Gas Supply," and "Gas-Fitting," provided such candidates are eligible under the rules.

Under the various headings, there appears the customary list of works of reference useful for students in the particular subject dealt with. These lists have, it may be mentioned, been revised. The examination fees in many subjects have been altered.

GERMAN ASSOCIATION OF GAS AND WATER ENGINEERS.

Proceedings at the Annual General Meeting.

ONLY a brief account of the proceedings at the fifty-seventh annual meeting of the German Association, which was held at Berlin on June 28, has so far reached us. Pending the receipt of the official report of the proceedings, we give from the information to hand the following particulars.

The meeting was held in the rooms of the Urania Society, and was attended by 357 members, as compared with an attendance of 235 last year. These figures are, of course, far short of the number of participants in these gatherings in peace time, when there are almost invariably over one thousand names on the list of those present. But this year ladies, and a large proportion of the foreign visitors, were absent.

The meeting was opened by the President, Herr Hase, the Manager of the Lubeck Gas-Works. A telegram of good wishes was read from Dr. Karl Bunte, the General Secretary of the Association, who is serving with the colours in hostile territory at present occupied by the German army. Congratulations were extended to Herr Leonhard Körting, formerly Manager of the Hanover works of the Imperial Continental Gas Association, on being within two weeks of his eighty-second birthday, and being present at the meeting in full health and vigour. He has been a member of the Association for fifty-one years. The Bunsen-Pettenkofer Award of Honour was bestowed on Herr Ernst Körting, the General Manager in Berlin of the Association, and son of Herr Leonhard Körting, and on Dr. Julius Bueb, the inventor of the Dessau vertical retort, who attended the meeting as representative of the German War Office, where he has rendered good service to the gas industry since the war started.

The President read a paper on the "Influence of the War on the Gas Industry;" and this was followed by an informal discussion of "War Measures and Experiences." A lecture was then given by Professor W. Salomon, Director of the Geological Institute of the University of Heidelberg, on the "Supply and Use of Water in the Field." The technical proceedings concluded with a lecture by Dr. Hübner, of the firm of Julius Pintsch, of Berlin, on the "Use of Coal Gas for Lighting Railway Carriages"—illustrated by numerous lantern slides.

The meeting closed about three o'clock in the afternoon; but most of those attending met again in the evening at the "Rheingold" Restaurant.

Production of Petroleum in the United States.—The output of petroleum in the Appalachian oil field, which includes the oil areas in New York State, Pennsylvania, West Virginia, Kentucky, and South-Eastern Ohio, was 22,860,048 barrels—a decrease of 1,241,000 barrels compared with 1914. The reduction is evenly distributed, and is small in view of the fact that the oil market did not begin to recover until August from the depression caused by over-production at Oklahoma. The average price at the wells was $1.55 per barrel, and showed an average market value 22 per cent. less than that for the year 1914. Drilling activity, which generally synchronizes with market conditions, was below the normal. Out of 5197 completed wells, 2905 yielded oil, 1254 were classed as gassers, and 1038 were barren.

Massachusetts and a Calorific Standard.—The Massachusetts Gas and Electric Light Commission are proceeding under an Act which provides for the establishment of a heat-value standard for gas. The law was enacted upon the recommendation of the Commission, after much consideration, and in the light of studies made by their inspection department of experiences elsewhere. In accordance with the Act, the Commission intend to carry out a series of experiments on gas companies plants, the use of which has been offered for the purpose. The experiments will run for at least six months; and there will be a temporary suspension of candle-power tests in connection with the plants selected. This will enable the managers of the plants to operate without any fear of penalty for deficient candle power; a tentative minimum of 500 B.Th.U. having been fixed instead. The Commission will keep in close touch with the plants; and daily reports will be required from the managers.

INTERMITTENT VERTICAL RETORTS AT LEEDS.

Second Installation at the Meadow Lane Gas-Works.

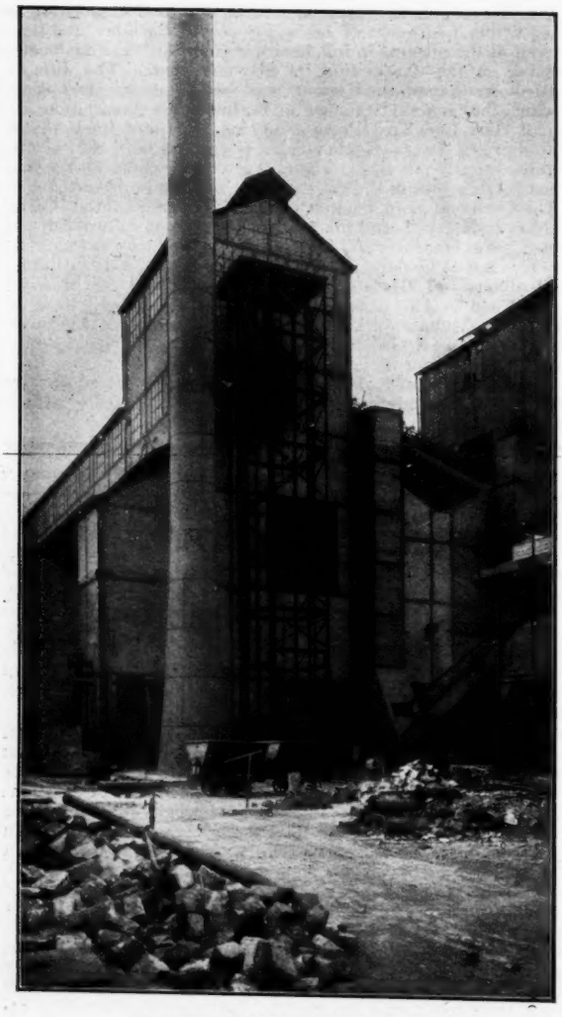
We have received from Mr. W. B. Leech, the Engineer and Manager, the following particulars and illustrations of the second installation of intermittent vertical retorts erected at the Meadow Lane works of the Leeds Corporation Gas Department.

The greater part of the reconstruction scheme of the Meadow Lane works of the Leeds Corporation Gas Department has been postponed on account of the war. Only one-fourth of the loan asked for was granted; and, therefore, instead of being able to proceed with a plant capable of producing 4½ million cubic feet of gas per day, as was the Committee's intention, the capacity of the carbonizing plant included in the modified scheme was 1 million cubic feet per day. As there was enough room opposite the existing bench of Dessau vertical retorts, and as these had been working satisfactorily for about fifteen months, it was decided to duplicate that plant; and the contract was placed with Messrs. Goodall, Clayton, and Co., of Hunslet, in April, 1915. It was stipulated, however, that no patent royalties should be paid on this plant.

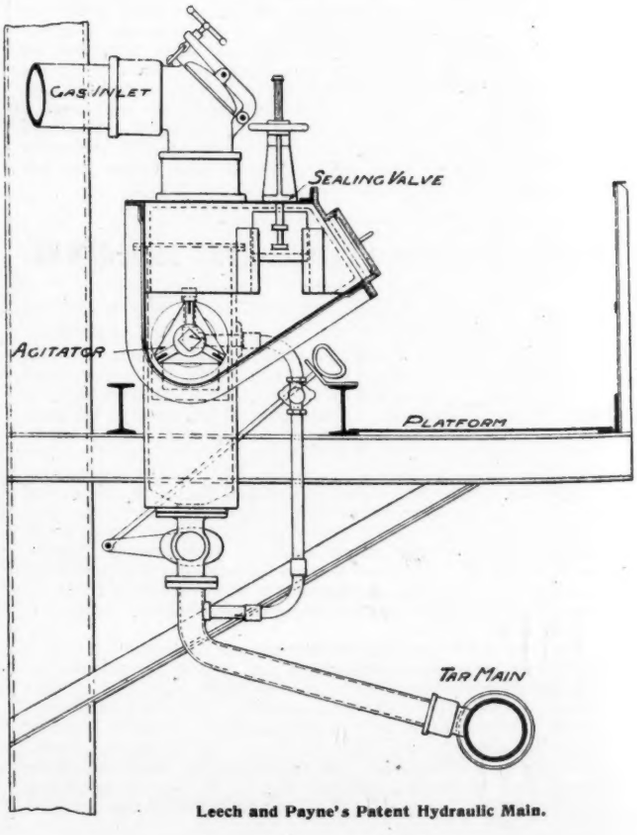
The design of the retort-setting of the second installation is identical with the first one. The lower half of the retorts, which, on the recommendation of the designers of the setting, had hitherto been secured from Germany, were obtained in England. This change, however, was not entirely due to the war. The installation of Dessau retorts built at the Dronfield Gas-Works, and set to work in 1910, was entirely built of English materials; and this plant worked for 1582 days before being reset. Further convincing tests were made by Mr. Chas. Dru Drury, at the Ayres Quay Gas-Works, Sunderland.

The design of the top mouthpieces, the gas take-off pipes, and the hydraulic mains, &c., was completely altered. The temperature of the gas in the hydraulic and foul mains of the first installation was much too high; and stoppages, chiefly due to ammonium chloride, were frequent during the first few months' working, and occurred in the foul-gas mains as far as 60 to 70 feet from the end of the bench. The diameter of the gas take-off pipes was increased from 6 to 8 inches, the foul main was raised considerably,

An Interior View.



Exterior of the New Retort-House.



Leech and Payne's Patent Hydraulic Main.

THE CHARGING HOPPERS AND RETORT INLETS.

and the connecting pipes were increased in number and size, and were of wrought iron instead of cast iron as on the first plant.

The cooling effects of these alterations have been remarkable, as will be seen from the following table; and up to the present no stoppages have occurred:

Comparison of Temperatures.

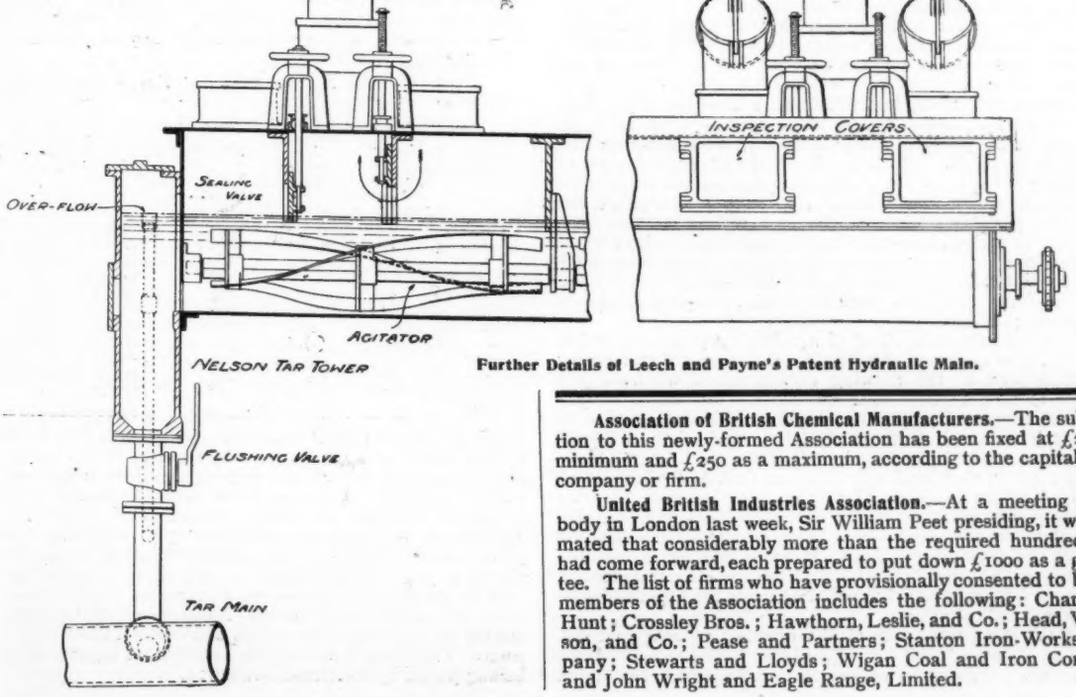
	No. 1 Bench. Deg. C.		No. 2 Bench. Deg. C.
Off-take	385	..	—
Uptake, immediately above hydraulic main	184	..	95
Foul main	142	..	83
Outlet governor	90	..	80·5
Junction with underground foul main	90	..	76·5

Temperature taken on No. 1 Bench, May, 1915.
" " No. 2 " June, 1916.

The hydraulic main is of a new type (Leech and Payne's patent); there being no dip-pipes. A sealing valve is provided for each gas take-off pipe; and the main is so arranged that any compartment may be inspected at any time, without interfering with the working of the remainder.

A test of the plant has been recently made; and the results are given below. Tar washing was stopped during the period of the test. The coal used was an average quality of West Yorkshire coals.

	Average Figures or Three Days' Test.
Coal carbonized. Tons	236·7
Number of retorts worked	90 × 3 days = 270
Coal carbonized per retort per charge	8·77 cwt.
Gas made. Cubic feet (corrected)	3,384,976
Gas made per ton. Cubic feet (corrected).	14,301
" per retort. " "	12,537
Illum. power No. 2 "Metropolitan" burner	13·9
Calorific value. Net	500·6
" multiple (corrected)	7,160,000
Sperm value per ton of coal	679·8 lbs.
Steam	8 lbs.

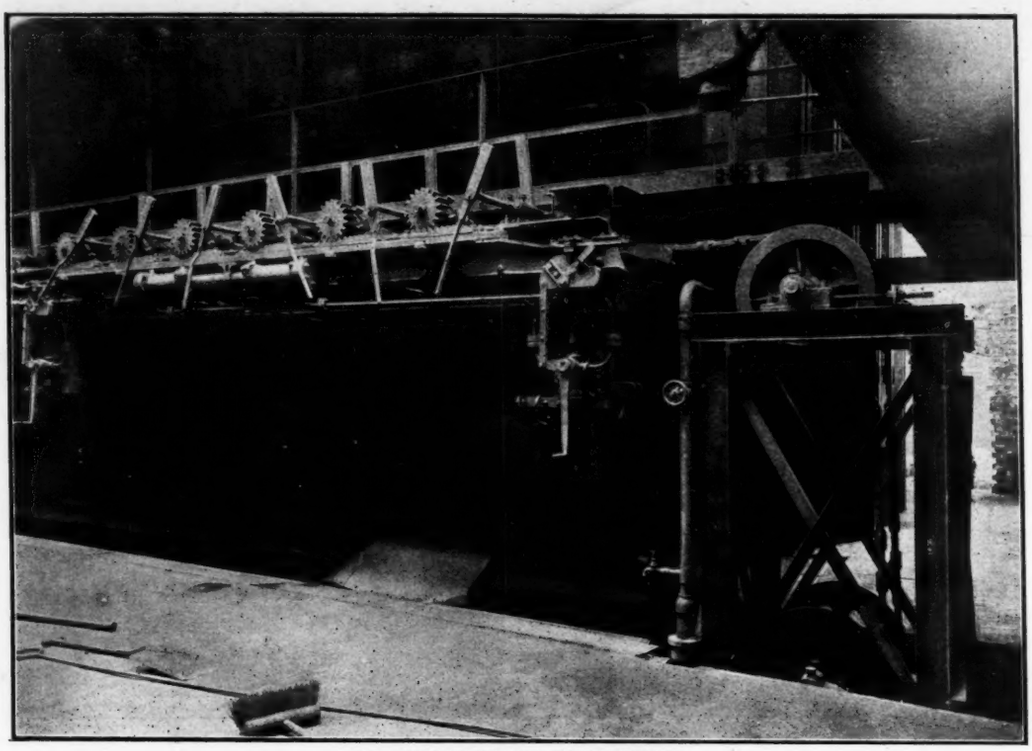


Further Details of Leech and Payne's Patent Hydraulic Main.

Association of British Chemical Manufacturers.—The subscription to this newly-formed Association has been fixed at £25 as a minimum and £250 as a maximum, according to the capital of the company or firm.

United British Industries Association.—At a meeting of this body in London last week, Sir William Peet presiding, it was intimated that considerably more than the required hundred firms had come forward, each prepared to put down £1000 as a guarantee. The list of firms who have provisionally consented to become members of the Association includes the following: Chance and Hunt; Crossley Bros.; Hawthorn, Leslie, and Co.; Head, Wrightson, and Co.; Pease and Partners; Stanton Iron-Works Company; Stewarts and Lloyds; Wigan Coal and Iron Company; and John Wright and Eagle Range, Limited.

INTERMITTENT VERTICAL RETORT INSTALLATION AT LEEDS.—See pp. 210-11.



THE DISCHARGING ARRANGEMENTS.

THERMAL PROBLEMS FOR GAS ENGINEERS.

IV.

By Norton H. Humphrys, Assoc.M.Inst.C.E., F.C.S.

"Visible" and "Latent" Heat.

The evolution or absorption of heat, as evidenced by the well-known sensations of heat or of cold, and rendered visible and measurable by the rise or fall of the mercury in a thermometer, is only one factor in the exhibition of energy known as a heat reaction. In addition, a quantity of heat either disappears, and is then called "latent" heat, or a certain quantity of latent heat becomes evident as visible heat. This will be readily understood from the example of water, steam, and ice. I retain these as the usual expressions or ways of explaining common phenomena that are really of a very complex nature, of which the entire routine is possibly not yet understood. A heat reaction is always attended with manifestation of energy in other forms, such as mechanical force or horse power, sound, light, electricity, not to mention other more obscure varieties; and the heat which we describe as latent frequently ceases to exist as heat, but is converted into other forms of energy.

The degree of heat required to convert 1 lb. of ice at 32° Fahr. into steam at 212°, might appear to be 212° − 32° = 180°; but the degree actually required to produce such a result is more than seven times as much. The heat absorbed or rendered latent by the thawing of the ice is 142·4 units, and that for the evaporation of water into steam is 966 units. No less than 1108·4 units disappear, and possibly cease to exist as such, and, adding the visible heat (180), we arrive at a total of 1288·4 units, the whole of which again becomes visible on reversing the action. Some of the latent heat is converted into mechanical molecular energy due to physical change of form, and does work involved in expansion against atmospheric pressure.

As a general rule, the melting of a solid is a positive reaction, as is also the evaporation of a liquid. But there are remarkable exceptions, such as the thawing of ice, which we have just observed to be a negative reaction, and the conversion of solid carbon into the gases carbon monoxide or carbon dioxide. Certain solids, such as metals, form the heaviest matter known, liquids are intermediate, and gases are by a long way the lightest. Many solids are lighter than, and will therefore float on the surface of, liquids. A hollow reservoir of iron or other substance heavier than water will swim because the bulk of the liquid displaced is heavier than the combined weight of the casing and the enclosed air. But the heaviest gas known is something like a hundred times lighter than the lightest liquid, and the few instances of quiescent solids or liquids that will float in air are explainable by the hollow-box illustration.

Table IV. gives some idea of the quantity of heat that disappears or becomes latent when liquids are boiled and converted into vapour. The degree of pressure under which the liquid exists exercises an important effect both on the boiling point and the latent heat; and when the boiling point rises, the latent heat diminishes. It will be observed that the latent heat of water is more than twice as much as that of any other liquid. A liquid cannot exist as such at a temperature much exceeding its boiling point. A rapid supply of heat increases the speed and power of ebullition;

Latent Heat of Vaporization.

Table IV.—*Latent Heat of Vaporization at 30 Inches Pressure.*

Water	Boils at 212°	..	966 B.Th.U.
Alcohol	,, 173°	.	457 ,,
Ether	,, 132°	..	313 ,,
Oil of turpentine	,, 316°	..	184 ,,
Naphtha	—	..	184 ,,
Benzene	,, 176°	.	436 ,,
Carbon disulphide	,, 108°	..	201 ,,

but so long as any liquid remains, it does not exceed the boiling point at the pressure under which it exists. The boiling point of water is usually taken at 212°; but this is only true when the atmospheric pressure stands at 30 inches. Under ordinary variations of the barometer, it ranges from about 209° at 28 inches, to 214° at 31 inches.

Table V.—*Boiling Points at Various Pressures.*

Lbs. Mercury Absolute.	Lbs. Mercury Above or Below Atmosphere.	Lbs. per Square Inch Above Atmosphere.	Water.	Alcohol.	Oil of Turpentine.	Ether.
			°	°	°	°
5	−25	−12·2	134	101	210	20
10	−20	− 9·8	162	127	248	45
15	−15	− 7·3	180	144	271	62
30	..	..	212	173	316	100
60	30	14·7	249	206	353	132
90	60	29·4	273	228	377	157
120	90	44·1	291	245	395	177
150	120	58·8	306	258	410	192
180	150	73·5	319	270	423	206
240	210	103	339	289	443	228
300	270	132·3	357	305	461	246

The presence of other bodies in solution in a liquid affects the boiling point; and the greater the quantity of foreign matter so held, the greater the effect, which is therefore influenced by the relative solubility of various substances. Saturated solutions of potassium chloride or sodium chloride boil at 227°, calcium chloride at 355°, sodium acetate at 256°, potassium acetate at 336°, potassium nitrate at 240°, sodium nitrate at 250°, and calcium nitrate at 304°. This property is utilized, both in the laboratory and for practical purposes, as a means of obtaining a bath of fixed and known temperature. Solutions or mixtures of liquids usually show independent action, and each retains its own boiling point. Therefore it is possible to separate liquids of different boiling points by fractional distillation.

Specific Heat.

The specific heat of a substance is the relative quantity of heat required to raise its temperature from the standard to the extent of 1°, and is conveniently expressed in British thermal units. As this standard refers to 1 lb. weight, the figures given also refer to 1 lb. weights of each substance; but, like specific gravity, they are independent of absolute weight. There is a similarity between specific heat and the evaporation of a liquid. In each case a certain quantity of heat becomes latent, and possibly passes into other forms of energy.

We may expose a known bulk (say, a cubic inch or cubic foot) of a substance to increase of temperature under two conditions—a free exposure to the atmosphere, or in a confined and inelastic environment. It may be accurately fitted into a box with a closely-fitting lid, the arrangement being absolutely fluid and air tight, or it may simply rest on a suitable support, be contained in an open vessel, or in a balanced gasholder. In the first case, it cannot expand or contract in volume; in the others, it is perfectly free to do so. The first gives us the data for specific heat at constant volume, the others at constant pressure. The first is always less than the second, which includes work done against the pressure of the atmosphere, if the substance expands, or the addition of work done on it by the pressure of the atmosphere in case of contraction.

Table VI.—*Apparent Specific Heat of Various Substances at Constant Pressure.*

Metals.	Specific Heat B.Th.U.	Atomic Weight Hy = 1.	Specific Heat × Atomic Weight.	Various.	Specific Heat.
Iron (wrought) .	·11460	55·4	6·348	Coal (about) . .	·2412
Zinc	·09555	64·85	6·196	Coke ,, . .	·2008
Copper . . .	·09650	62	5·983	Brick, red (about)	·200
Tin	·05695	118	6·720	,, fire ,,	·220
Gold	·03244	196	6·358	Ice	·504
Platinum . . .	·03243	194	6·291	Alcohol . . .	·622
Bismuth . . .	·03084	206	6·353	Ether	·521
Silver	·05701	107	6·100	Benzene . . .	·395
Mercury . . .	·03332	198	6·587	Oil of turpentine	·472
Lead	·03140	206	6·468	Petroleum (about)	·434
	..	..	..	Oil (olive) . .	·310
Sulphur . . .	·20259	32	6·483		
Gases.					
Air	·2374	14·42	3·423		
Oxygen. . . .	·2175	16	3·472		
Hydrogen . . .	3·4090	1	3·409		
Nitrogen . . .	·2438	14	3·413		
Carbon monoxide	·2450	14	3·430		
Carbon dioxide .	·2163	22	4·759		
Vapour of water .	·4805	..	..		
Methane . . .	5929	8	4·743		
Ethylene . . .	·4040	14	5·656		
Benzene . . .	·3754	39	14·641		

When solids or liquids are concerned, the difference is not great; but with gases it is more important, and, in the instance of elementary gases, is found at 32° Fahr. to approximate closely to the ratio 1 : 1·41, and to increase slightly with increase of temperature in proportion to increase of bulk. With compound gases, it varies according to the complexity of the molecule. If 1 cubic foot of air at 32° is increased in temperature to 33°, it expands in volume to the extent of $\frac{1}{491{\cdot}4}$ cubic foot against atmospheric pressure, which may be taken as 14·7 × 144 = 2116 lbs. per cubic foot, and therefore has to do the work of lifting 2116 lbs. to a height of $\frac{1}{491{\cdot}4}$ foot, which is equivalent to 4·3 foot-pounds. The bulk of 1 lb. of air at 32° is 12·4 cubic feet; therefore the work done per pound of air is 4·3 × 12·4 = 53·32 foot-pounds.

The specific heat of air is 0·2374 [Table V.]. Dividing this figure by 1·41, we get the specific heat at constant volume as 0·168, and a difference of 0·0694, which, according to Joule's equivalent of heat [1 B.Th.U. = 772 foot-pounds], is 53·57 lbs.

Nearly all practical operations are concerned with specific heat at constant pressure, which is the condition in view when the property is stated without other qualification. Following the analogy furnished by calorific values, constant volume might be called the "net," and constant pressure the "gross," specific heat. The specific heat rises with increase of temperature slightly in the case of solids and liquids, but more so with gases, and appears to follow a higher ratio than that of the temperature, at high figures.

Table VII.—*Specific Heats at Various Temperatures.*

—	60°.	572°.	1000° C. 1832°.	2000° C. 2832°.
Mercury	0·333	0·350	..	..
Silver	0·570	0·611	..	..
Zinc	0·955	1·015	..	..
Iron	0·115	0·220	..	..
Platinum	0·324	0·350	0·373	..
Water vapour	0·480	..	0·540	0·759
Carbonic dioxide . . .	0·216	..	0·323	0·500
Nitrogen	0·244	..	0·257	0·344
Oxygen	0·217	..	0·2251	0·3014

There is a remarkable coincidence with regard to several of the elementary bodies, that would appear to indicate some connection between specific heat and bulk. Table VI. shows the figures for metals, common materials, liquids, and gases. Both with regard to the metals and gases, the atomic weight, multiplied by the specific heat, gives an approximate constant approaching 6·3 in the first case, and 3·4 in the second. The difference between the solids may be due to the difficulty of obtaining them in an absolutely homogeneous and non-porous state. The rule also applies to some mixtures and simple compounds, such as air and carbonic monoxide, but not to compounds in general.

Pressure.

The effects of pressure as regards solids and liquids are so slight that they need not really be considered in connection with everyday operations. With a pure gas, however, the volume varies inversely as the pressure. If the pressure is doubled, the volume is halved; and it must be understood that in this connection absolute pressure is considered, and not merely the excess above that of the atmosphere. The variations thus caused in the volume of town gas by ordinary supply pressures are so small that they are usually disregarded. Since the specific gravity of mercury is 13·6, the weight of 30 inches is equivalent to 30 × 13·6 of water = 408 inches. The effect of adding 6 inches of water pressure to a gas at level gauge is to reduce the bulk to the extent of $408 - \frac{408}{408+6} = 1{\cdot}45$ per cent. From this we get a convenient rule for a range of a few inches of water—viz., + or − 1 inch = + or − 0·25 per cent., or one part in 400. With regard to high-pressure distribution, there is the advantage that the reduction in bulk increases the distribution in proportion; and the question of the pressure under which the gas is measured for sale must not be overlooked. At 15 lbs. pressure, 1000 cubic feet of gas will represent 500 cubic feet at 30 lbs., and 250 cubic feet at 60 lbs.

(To be continued.)

Waverley Association of Gas Managers.—At the meeting of the Waverley Association of Gas Managers held on June 9, in Edinburgh, it was mentioned that the Association was formed in the year 1861. The father of Mr. John Young, of Hull, wrote him: "I went to Hawick in September, 1863, and, of course, at once became a member. The members at that time, so far as I recollect, were Mr. Robson (Selkirk), Mr. Adamson (Galashiels), Mr. Hogg (Melrose), Mr. Clazy (Kelso), and myself. So far as I know, I am the only living member of the pioneer Waverley Association of Gas Managers." The meetings were held at members' houses; and during his six years' residence in Hawick, Mr. John Young, sen., can remember several of these meetings taking place at the Hawick Gas-Works.

Notts Coal and Gas Manufacture.—The information was forthcoming at the last meeting of the Mansfield Town Council [see p. 223] that increasing use is being made of local coal for the purpose of gas manufacture. In no part of England have greater developments taken place in regard to mining enterprise in recent years than in this part of Nottinghamshire; one of the new pits having established a world's record for output within a given period. It was, therefore, interesting to learn that during the past year gas has been made, with most encouraging results, from a local coal. Mr. J. P. Houfton, one of the best known authorities upon coal mining in the Midlands, and a member of the Mansfield Corporation, pointed out at the meeting the importance of the matter, from the point of view of Mansfield's future prosperity as a centre of gas-coal supply—observing that experience had entirely dissipated the notion that local coal was not suitable for gas manufacturing purposes.

Prohibited Exports.—An Order in Council has been issued making (among others) the following alterations to the prohibited exports list: To be deleted: (A) anthracene oil; (A) coal tar, all products (except creosote) obtainable from and derivatives thereof, suitable for use in the manufacture of dyes and explosives, whether obtained from coal tar or other sources, and mixtures containing such products or derivatives; (C) creosote, (A) green oil, (A) sulphuric acid; (C) oils, creosote, except wood tar oil; (C) pitch, coal tar. To be added—(C) anthracene oil and mixtures and preparations containing anthracene oil; (C) coal tar, all products obtainable from and derivatives thereof, suitable for use in the manufacture of dyes and explosives, whether obtained from coal tar or other sources, and mixtures and preparations containing such products or derivatives (except anthracene oil and green oil and mixtures and preparations containing these oils; (C) creosote and creosote oils (except wood tar oil) and mixtures and preparations containing such creosote or creosote oils; (C) green oil and mixtures and preparations containing green oil; (A) sulphuric acid and mixtures containing sulphuric acid; (C) pitches and all mixtures, preparations, and commodities, of which pitch forms an ingredient. Goods marked (A), to all destinations. Goods marked (B), to all ports and destinations abroad other than ports and destinations in the British Possessions and Protectorates. Goods marked (C), to all destinations in foreign countries in Europe and on the Mediterranean and Black Seas, other than France and French Possessions, Russia, Italy, and Italian Possessions, Spain and Portugal, and to all ports in any such foreign countries, and to all Russian Baltic ports.

THE ALIGNMENT DIAGRAM APPLIED TO THE FLOW OF WATER IN UNIFORM AND COMPOUND MAINS.

At the Summer Meeting of the Institution of Water Engineers, Mr. D. Halton Thomson, M.A. (Cantab.), Assoc.M.Inst.C.E., read a paper on this subject, from which and the discussion an indication only of some of the main points can be given here.

The alignment diagram is a comparatively new method of graphical representation, which, as applied to flow in water-mains, has (the author claims) some important advantages, both in construction and use, over those now commonly employed. Not only can the usual relation between the discharge, diameter, and loss of head of a single uniform main be ascertained, but the method may without complexity be extended to determine the flow in compound mains—*i.e.*, combinations of uniform mains of different lengths and diameters. The extension is made possible by taking advantage of the principle that any combination of mains of given lengths and diameters may be replaced by a single imaginary equivalent main of uniform diameter having the same discharge and loss of head.

The diagram is based on the general formula for flow in pipes:

$$i = \frac{h}{l} = k\frac{q^m}{d^n} \quad \ldots\ldots\ldots\

scales an index-line intersecting the p-scale at the required carrying power (p) = 3.

Example 4.—Given main A of diameter (d) = 12 inches and length (l) = 900 feet, and main B of diameter (d) = 30 inches and length (l) = 8000 feet; required, their relative carrying power.

For main A draw through the given values of d and l on their respective scales an index-line intersecting the p-scale at (p) = 1·2. For main B draw through the given values of d and l on their respective scales an index line intersecting the p-scale at (p) = 4·5. Then the relative carrying power of A to B is as 1·2 is to 4·5, or as 1 is to 3·75.

Equivalent Diameters and Lengths.

Let q, d, p, i, h, l, represent respectively the variables of pipe-flow as already defined by equations (1) and (2) and apply to a given main; let Q, D, P, I, H, L, represent the same variables and apply to an equivalent main. The general equation for the latter is therefore:—

$$P^m = \frac{Q^m}{H} = \frac{D^n}{kL} \quad \ldots\ldots(3)$$

But since two mains are said to be equivalent when they discharge at the same rate under the same head, it follows from equations (2) and (3) that their carrying power must be equal. Putting, therefore, $P = p$, a main of diameter (D) and length (L) is equivalent to a main of diameter (d) and length (l) when

$$\frac{D^n}{L} = \frac{d^n}{l} \quad \ldots\ldots(4)$$

In the diagram the condition of equal carrying power is observed when the index-lines dpl and DPL for the given and equivalent mains, respectively, intersect on the p-axis.

Example 5.—Given a main of diameter (d) = 15 inches and length (l) = 40,000 feet; required, the length of main (L) which would discharge at the same rate with the same loss of head, if the diameter were changed to (D) = 10 inches.

Draw through the given values of d and l on their respective scales an index-line intersecting the p-axis at (p) = 0·3. An index-line passing through diameter (D) = 10 and (p) = 0·3 intersects the l-axis at the required length (L) = 5400 feet.

Equivalent Discharges and Heads.

The carrying power axis may also be used to determine in any main the change in discharge consequent upon a change in head, or *vice-versâ*; for it follows from equations (2) and (3) that when $P = p$

$$\frac{Q^m}{H} = \frac{q^m}{h} \quad \ldots\ldots(5)$$

and that the index-lines qph and QPH for the given and required discharges respectively must intersect on the p-axis.

Example 6.—Given a discharge (q) = 7 cubic feet per second and loss of head (h) = 8 feet; required, the loss of head (H) when the discharge is changed to (Q) = 12 cubic feet per second.

Draw through the given values of q and h on their respective scales an index-line intersecting the p-axis at (p) = 2·3. An index-line passing through discharge (Q) = 12 and (p) = 2·3 intersects the h-axis at the required loss of head (H) = 25 feet.

It may also be noted that Examples 1 and 2 might have been solved by the use of the p-axis instead of the i-axis. Thus, in Example 1, an index-line through (q) = 4 cubic feet per second and (h) = 10 feet intersects the p-scale at (p) = 1·2; an index-line through (l) = 4000 feet and (p) = 1·2 intersects the d-axis at the required diameter (d) = 16 inches. And, in Example 2, an index-line through (d) = 8 inches and (l) = 0·75 mile intersects the p-scale at (p) = 0·2; an index-line through (q) = 0·25 million gallons per 24 hours, and (p) = 0·2 intersects the h-axis at the required loss of head (h) = 4·5 feet.

Compound Mains.

There are two cases of common occurrence:

(1) When two points are connected by a single main with two or more lengths of different diameter laid "in series."

(2) When two points are connected by two or more mains of different diameter laid "in parallel," but not necessarily of the same length or by the same route. The term "parallel" is therefore used not in its literal, but in its electrical, sense.

Either type may be replaced by a single equivalent main of uniform diameter. Any network of mains partly in series and partly in parallel can also be replaced by an equivalent main, if such network can be divided into sub-sections, each having one inlet-point and one outlet-point, between which the pipes are either wholly in series or wholly in parallel. When this sub-division cannot be completely effected, the problem is in practice determinable only by trial and error, but the labour involved in this method can be minimized by expressing in terms of a common diameter the pipes of any network remaining after the system has been reduced as far as possible under the above two special cases. Moreover, it is often possible to express any combination of mains completely in terms of those cases by making slight adjustments and assumptions. For instance, cross-connections may contribute but little to the carrying power of a pipe-system, since the difference of pressure between the two ends is often small. As a first approximation, their omission has but little effect on the flow, and is, at any rate, on the safe side in that the total carrying-power tends to be underestimated.

Let the variables of pipe-flow for each uniform component length of a compound main be distinguished by the suffices, 1, 2, 3.....; thus, the discharges by q_1, q_2, q_3....., the diameters by d_1, d_2, d_3....., and so on. As before, let Q, D, P, I, H, L, represent the corresponding variables of the equivalent main.

Mains "in Series."

For these mains it is easily proved that

$$\frac{L}{D^n} = \frac{l_1}{d_1^n} + \frac{l_2}{d_2^n} + \ldots\ldots$$

(Note.—$Q = q_1 = q_2 =$.....and $H = \Sigma h$).

In view of Equations (2) and (3), each term may be expressed as carrying power, thus:

$$\frac{1}{P^m} = \frac{1}{p_1^m} + \frac{1}{p_2^m} + \ldots\ldots$$

and if $S = \frac{1}{P^m}$, $s_1 = \frac{1}{p_1^m}$, $s_2 = \frac{1}{p_2^m}$, ...

$$\text{then } S = s_1 + s_2 + \ldots\ldots(6)$$

or, in words, the value of S for the equivalent main is equal to the sum of the values of s for the component mains. This suggests that an s-scale introduced into the alignment diagram would enable the individual terms on the right-hand side of Equation (6) to be read off directly, and the value of S obtained by simple addition. The s-scale, therefore, has been plotted on the p-axis, and the diameter (D) and length (L) of the equivalent main are determined by the intersections on the d and l scales of any index-line passing through the calculated value of S.

Example 7.—Given a compound main in three lengths, l_1, = 5·2 miles, l_2 = 0·44 mile, l_3 = 1·5 miles, laid "in series," the corresponding diameters being d_1 = 10 inches, d_2 = 4 inches, d_3 = 6 inches; required, the diameter (D) of an equivalent uniform main of length (L) = 7·14 miles.

Draw index-lines through $d_1\ l_1$, d_2, l_2, d_3, l_3, plotted on their respective scales. At their intersection with the s-scale read off the values $s_1 = 50$, $s_2 = 500$, $s_3 = 200$, and add them together, giving $S = 750$. An index-line passing through S and L plotted on their respective scales will intersect the d-axis at the equivalent diameter (D) = 6·5 (say 7) inches.

Mains "in Parallel."

For these mains it is readily shown that

$$\left(\frac{D^n}{kL}\right)^{\frac{1}{m}} = \left(\frac{d_1^n}{kl_1}\right)^{\frac{1}{m}} + \left(\frac{d_2^n}{kl_2}\right)^{\frac{1}{m}} + \ldots\ldots$$

(Note.—$H = h_1, = h_2$.....and $Q = \Sigma q$.)

In view of equations (2) and (3), each term may be expressed as carrying power, thus:

$$P = p_1 + p_2 + \ldots\ldots(7)$$

or, in words, the value of P for the equivalent main is equal to the sum of the values of p for the component mains. This indicates that the p-scale enables the individual terms on the right side of Equation (7) to be read off directly, and the value of P obtained by simple addition. Similarly to the previous case the diameter (D) and length (L) of the equivalent main are determined by the intersections on the d and l scales of any index-line passing through the calculated value of P.

Example 8.—Given a compound main in two lengths l_1 = 10,500 feet, and l_2 = 850 feet laid "in parallel," the corresponding diameters being d_1 = 12 inches and d_2 = 8 inches; required, the length (L) of an equivalent uniform main of diameter (D) = 15 inches.

Draw index-lines through $d_1\ l_1$, $d_2\ l_2$, plotted on their respective scales. At their intersection with the p-scale read off the values $p_1 = 0{\cdot}35$, $p_2 = 0{\cdot}45$, and add them together giving $P = 0{\cdot}8$. An index-line passing through P and D plotted on their respective scales will intersect the l-axis at the equivalent length (L) = 6000 feet.

[The concluding parts of the paper illustrated the application of the system to a network of pipes.]

DISCUSSION.

In the course of a long discussion,

The President (Mr. F. W. M'Cullough, of Belfast) expressed the obligations of the members to Mr. Thomson for his excellent paper and ingenious diagram.

Mr. E. J. Silcock (Leeds) also acknowledged the ingenuity of the system, and said it was one which would facilitate, in a most admirable manner, calculations in connection with the discharge capacity in a network of mains. The introduction of the factor of "carrying capacity" gave them a method of manipulating this sort of problem of which they had no knowledge before. The only criticism that he had to offer on the diagram and the system generally was that the result of the examples as given did not seem to conform so far as discharge capacity was concerned with the formula in common use. No doubt this was due to the fact that the formula on which the diagram was based was taken from Unwin's "Hydraulics;" but Kutter's formula, with the co-efficient of friction of 0·013, was the one which, in his individual

experience, gave the most accurate results for the discharge of water-mains. Working out examples Nos. 1 and 2 given in the paper, in No. 1 there was a discharge of 4 cubic feet per second by the diagram, and Kutter's formula gave 3·75 cubic feet. This was pretty near; showing a difference of only about 7 per cent. In example No. 2, the discharge capacity varied to a much greater extent—viz., by 27 per cent. He drew two other examples in order to show how they would compare, taking what one would call normal conditions. With a 24-inch pipe, and a fall of 5 feet per mile, the discharge capacity was found almost identical—the difference was only about 1 per cent. The other example was a 3-inch diameter pipe, with a loss of head of 20 feet per mile. In this case, there was a difference of over 50 per cent. in the discharge capacity, as compared with the discharge obtained by the table. There must surely be some reason for this. It appeared as if the formula on which the diagram was based agreed with Kutter's formula for large pipes, but not for small ones with large heads. He suggested to the author that he would be rendering water engineers a service if he would reconstruct the diagram upon Kutter's formula, because he (Mr. Silcock), as he had said, thought it gave most accurate results. He agreed, however, that it was an inconvenient formula with which to work, and that his suggestion would involve the author in a great deal of labour.

Mr. C. H. Roberts (Aberdeen) pointed out that the alignment diagram had been in use in America and on the Continent for some years; but he thought they had to thank the author for the extension of it to carrying power, loss of head, and length. He had used a modification of the diagram which was due to Dr. Turneaure, and which gave the discharge, diameter, and hydraulic gradient. Another factor was velocity, which he thought was a useful line in dealing more particularly with pumping supplies than with gravitation ones. From Dr. Turneaure's book, he had made a little diagram for himself—giving discharge, diameter, hydraulic gradient, and million gallons per minute. He thought, however, the author's alteration to million gallons per twenty-four hours was a useful one. With regard to the extension made by the author, personally he was a little sceptical whether it would save much work in calculation. He rather agreed with what Mr. Silcock said about the formulæ, but joined issue with him as to the results. As the author had carefully explained, the formula which was the basis of the diagram took into consideration 30 per cent. loss of discharging capacity due to corrosion; and therefore it could not be applied to Kutter's formula, which was applied to new pipes.

Dr. H. Lapworth (London) viewed the extension made by the author with profound admiration. He considered it most ingenious and clever; and he ventured to think, when once it was thoroughly understood, it would be of great practical importance. The only point on which there could be discussion was as to the choice of formulæ. Some years ago he had to go into the question of designing a system of pipes from 4 up to 40 inches diameter; and he had to get all the reliable results he could. He came to the conclusion that it was a mistake to cut down the diameters too small. The question of the quality of the water had to be taken into account—whether one was dealing with a hard or a soft water. The deterioration of pipe capacity in the case of soft or moorland supplies was much greater than with hard water supplies. In these circumstances, one had to consider the period to which one was looking forward—if one wanted to have a certain estimated discharge in ten or fifteen years, one had to design the mains accordingly.

Mr. C. Clemisha Smith (Wakefield) uttered a warning against assuming values for the roughness of cast-iron pipes, especially when used for the passage of soft water. In such cases he had never been able to get anything but discordant results from the whole of the calculations he had made. If dealing with cast-iron pipes that had been laid for (say) 20, 40, or 70 years, one could only get their delivery by experiment, and not by calculation. He referred to certain experiences in this connection, and among them stated that, in connection with pipes of various ages, he had found some of the older ones did not appear to be more incrusted than those laid 30 or 40 years later. There seemed a period with soft water when the pipes attained to maximum corrosion.

Mr. J. S. Pickering (Cheltenham) said it appeared to him that with figures running to six places of decimals, it would be difficult to read the diagram with sufficient accuracy to get reliable results—in other words, it occurred to him that they could not get a diagram sufficiently large to be of any practical value.

Mr. Binnie (London) made some interesting remarks on investigations as to the effect of the rate of flow on corrosion of steel pipes. The results, generally put, were that when the flow was *nil*, the corrosion was least; when the flow was slow, the corrosion was at its maximum; when the flow was 4 feet per second, it was greater than that with still water, but much less than when the flow was slow.

Mr. A. B. E. Blackburn (Sunderland) remarked that "corrosion" had been frequently referred to in the discussion. He should like to know whether the gentleman who spoke of it actually meant corrosion or incrustation.

Mr. Binnie said he referred to corrosion, which was accompanied by large incrustation in the case of steel.

Mr. Clemisha Smith remarked that in his case it was almost entirely incrustation.

Mr. Thomson thanked the members for the way in which they had received the paper. He wished the members to fully understand that the only point for which he claimed anything new was the introduction of the carrying power scale. The rest of the diagram had been published—not quite in the same form, but in various forms in more than one publication. There had been a great deal of discussion as to the type of water to which the diagram applied. When he started the diagram, he naturally adapted it to the kind of water with which he had to deal—that was, hard chalk water. When he came to write the paper, he did consider the point as to whether the diagram should be redrawn, so as to comply with other types of water; but he came to the conclusion that it would be hopeless, dealing with so many different kinds of water, to try to draw a diagram which would comply with other individual experiences. He had therefore cut the Gordian knot, and prepared a diagram which applied to his own experience with hard water. He was rather surprised to hear the first speaker say that he used the Kutter formula, because he (Mr. Thomson) understood that modern experiments showed that, although Kutter's formula (with its complicated form) agreed very well with the flow of large pipes, it was almost useless in the case of small ones. Of course, Mr. Silcock might have to deal with a water to which by some chance it applied; but personally he preferred to express the flow of water in pipes by some kind of logarithmic formula. In order to use the alignment system, a logarithmic formula must be employed; it would be impossible to draw a diagram from Kutter's formula. He was not surprised to hear from some of the speakers that the diagram would not apply to their own experiences, seeing that it only applied to one type of water. There was no reason why the scale for velocity should not be introduced. But it was not absolutely essential to the calculations; and therefore, in order to keep the diagram as simple as possible, it was omitted. It had also been suggested that it would be better to omit the loss of head and length scales. Of course, for calculations which applied to single uniform mains, these scales were not necessary; but when they came to deal with compound mains, the loss of head and length were combined in different ways.

A NEW GAS LIGHTER.

Portable gas lighters, a convenience in many circumstances, may be confidently expected, with darker evenings, to enjoy a growth in their popularity, owing to the big increase in the price of matches. These appliances may be had, of course, of the simplest possible construction; and they are also made in more elaborate styles. To those who want the very best, Messrs. J. & W. B. Smith, of Farringdon Road, E.C., are offering a portable lighter fitted with a tiny electric lamp, which gives quite sufficient illumination to enable the user to see the position of the gas-burner, and thus obviate the risk of pushing the lighter against the mantle. A walnut case contains a battery; and the respective positions of the lamp and lighter will be seen in the illustration. Moving a lever lights the lamp; and similarly the pressing-in of a projecting piece on the case causes the electric spark which ignites the gas.

The action is simplicity itself; and the lighter is both strong and well finished. No risk of failure in operation need be apprehended so long as the battery lasts; and when this is exhausted, it can be replaced in a moment by a new one.

Gas Forges.—A forge just installed by the Paris firm of Darnault, for dealing with cycle parts and using gaseous fuel, was described in the "Journal des Usines à Gaz" for July 20. It is used particularly for forging the ends of bicycle forks, and is found to possess the great advantage of permitting the high temperature (1400° C.) to be localized strictly to the parts of these latter requiring to be treated, and thus of avoiding the weakening of the whole component. The gas consumption is 2 cubic metres (70 cubic feet) per hour.

Protest against the Increase in Coal Prices.—At a meeting of the Special Purposes Section of the Wales and Monmouthshire District Institution of Gas Engineers and Managers, held in the Gas Offices, Cardiff, on the 20th ult., the increase of 2s. 6d. per ton sanctioned by the order recently issued under the Coal Price (Limitation) Act, 1915, by the Board of Trade was fully discussed, and the following resolution was unanimously passed: "That a protest be sent against the increase of 2s. 6d. per ton in the price of coal made by the order of the Board of Trade under the Price of Coal (Limitation) Act, 1915; and that unless it is altered it will cause a great hardship on the local gas undertakings, necessitating an additional increase in the price of gas, and in the case of some local authority undertakings a call upon the rates." The Hon. Secretary (Mr. Octavius Thomas) was instructed to forward the resolution to the President of the Board of Trade, and ascertain if there was any right of appeal from the order.

THE "75 PER CENT. SAVING" HUMBUG.

Over the initials "F. W. G.," the following article, dealing with a matter to which attention has already been given in the columns of the "JOURNAL," appears in the August issue of the "Bulletin of the British Commercial Gas Association."

Last month, reasons were given for not taking steps to counter by advertisements the campaign of those engaged in exploiting gas-cooking appliances "guaranteed to save 75 per cent. of the gas bill." At the same time, it was stated that careful tests showed that the claims made for these marvellous inventions were entirely without foundation—were, in fact, the only marvellous inventions revealed by the investigations made; and a promise was given to supply details of the tests carried out. The publication of the details was at the moment deferred to get further tests made by another expert; so that there could be no possible mistake about the facts. These further tests confirm the earlier ones in every particular; and the results now given will be of interest both to the makers of the gas-cookers commonly in use and to those who sell, lend, or let them on hire to the public.

For the most widely advertised of the wonder-working cookers, it is claimed that it will cook a full course dinner at a quarter of the usual cost by gas. The following were the results of cooking (with equal quantities in each case) a dinner comprising a leg of lamb, potatoes, a fruit tart, and boiled rice and apples (A) by the "Marvel" and (B) and (C) by ordinary gas-cookers supplied by many gas undertakings.

	A (The "Marvel.")	B (Ordinary Cookers.)	C
Time occupied, minutes. . . .	125 ..	110 ..	95
Gas consumed, cubic feet . . .	47 ..	32 ..	36*

* In this case, in addition to the food mentioned above, there were also cooked six jam tarts, six dinner rolls, and a lemon sole.

In view of a claim made in respect of the same "marvellous" cooker, that there was less loss of weight in the meat cooked in it than if cooked in an ordinary gas-stove, a careful test was made on this point, with legs of lamb as nearly identical as possible; 1 lb. of potatoes and a small cabbage being cooked at the same time. The test (D) is included to show that for the same quantity of gas as used in the "Marvel" cooker (A)—or rather slightly less—a much larger quantity of food could be cooked—namely, in addition to the larger joint, ½ lb. of steak, ½ lb. plaice, a fruit tart, a pint milk pudding, 2 lbs. of potatoes, and a cabbage.

	Cooker A	B	C	D
Weight of joint before cooking, oz.	74 ..	78 ..	73 ..	104
Loss in cooking, per cent. .	19 ..	19 ..	18 ..	19
Time occupied, minutes . .	115 ..	105 ..	105 ..	120
Gas consumed, cubic feet. .	38 ..	20 ..	22½ ..	36½

The observer who made the foregoing test points out that the one burner used in the "marvellous" cooker uses about 24 cubic feet per hour, and can only be turned down a little, not lower than about 17 or 18 cubic feet, or everything stops cooking. The other observer, who has carefully tested the cooker in question, reports: The following comparison against an ordinary cooker (B) having an oven-space exactly equal to the "marvellous" cooker (A) shows clearly the absolute lack of foundation for the claims made on behalf of the latter:

	Time for Oven to reach 380°.	Rate per Hour to Maintain 380°.	Total Gas Used per Hour's Run.
A . . .	6 min. ..	16·8 cub. ft. ..	17·85 cub. ft.
B . . .	5 min. ..	10·8 cub. ft. ..	11·35 cub. ft.

In this test, the burner under the "marvellous" cooker was arranged primarily to heat the oven; but two kettles were placed in position so as to receive any surplus heat that could be so utilized. It was found that the water (4 pints) contained in the two kettles was heated from 63° to 116°, absorbing, therefore, 265 B.Th.U., equivalent to about 1 cubic foot of gas utilized with 50 per cent. efficiency. Acting, however, more than generously to the (A) cooker, and deducting 1·5 cubic feet from its total consumption, we find a difference of 5 cubic feet per hour in favour of the ordinary cooker, or instead of a saving of 75 per cent., an excess consumption in the "marvellous" cooker of 44 per cent. This very closely confirms the actual cooking tests, when the excess consumption was 47 per cent.

Many ordinary gas-cookers, of course, have larger ovens than these "marvellous" cookers, and would use for the heating of these larger ovens more gas than the small ordinary cookers used for the tests, but even then are almost, if not quite, as economical in practical use as those smaller cookers, because the space for cooking and the consumption of gas can be easily controlled. For example, a large oven cooker used 62 cubic feet in cooking "a full-course dinner" in 100 minutes. But this consisted of twice the quantity of food that could be got into the oven of the "guaranteed saver of 75 per cent.;" and if the smaller quantity which that oven holds had to be cooked in the oven of a larger gas-cooker, every experienced user of a gas-stove would know how to manage so as not to use as much gas as if the oven were packed full.

Thus, in the large cooker referred to, it was found that the rate of gas consumption that would maintain a temperature of 430° Fahr. in the total cooking space would maintain two-thirds of that space at 500°. This was simply done by putting the browning shelf part-way down the oven. Above this shelf the temperature was 400°. It was then found possible to maintain the lower part of the oven at 430° with a consumption reduced by over 25 per cent. as compared with that required to maintain this temperature in the whole oven.

In short, every test made clearly exonerated the ordinary type of cooker of any waste that could be cured by the use of these much advertised stoves, and proved, on the contrary, that those stoves for which such wonderful efficiency is claimed actually use more gas (to do the same work) than the stoves which are in general use.

STATUS OF AMERICAN BYE-PRODUCT COKE.

When recently addressing the New York Section of the Society of Chemical Industry, Mr. T. G. Clarke remarked that at present the bye-product ovens in the United States (including 1000 under construction) totalled 8677, while about 9500 beehive ovens yet remained in use. Out of a list of over sixty firms, running 12 to 640 bye-product ovens apiece, eight were gas undertakings.

The difficulties in the way of developing the modern coke-oven had been great—due in the first place to the imitation of German plans, without considering the different qualities of coal and labour conditions in America. They had endeavoured to make these fit the plant, instead of adapting the plant to local conditions. Cheap labour permitted the German practice of 28 to 36 hours heating of four to five ton charges; but American conditions pointed towards larger ovens and a shorter coking time, which obviously meant entire re-designing. Endeavours in this respect, between the years 1900 and 1906, resulted in many costly failures. Then the American Steel Corporation appointed a Committee to investigate bye-product plant; and the researches thus inaugurated had proved of great value. They saw that larger ovens were quite feasible, and selected the Koppers type, of which the first plant (put down seven years ago) was still at work in excellent condition. Another cause of delay was that bankers were very slow in taking up this class of investment.

The custom had been to put the ovens as near to the mines as possible, and to use unmixed coal. In bad times they might make very good coke, but in good times almost everything was shipped and accepted. Bye-product ovens near to steel-works solved a great problem, as various coals could be bought and mixed as desired, in suitable quantities. At first, there was an impression that fairly volatile coal would make metallurgical coke by itself, and such coal was mixed; but to-day excellent coke was being made from coal that averaged 30 per cent. or more of volatile matter. Inferior coke, if uniform, would show a saving in the blast-furnace; but common practice was to use two or three different makes, which were not really uniform, even if they appeared so, and the furnace might be operating under varying conditions. The same as to size. Breaking to a uniform size did wonders in the furnace, if it also increased the heap of breeze. In a 400-ton furnace, every 1 per cent. of ash in the coke meant putting in 4 tons a day of positively detrimental material costing $4 per ton. Limestone must be added as a flux, in proportion to the quantity of ash; and thus there was a further consumption of coke. So a low ash content justified the cost of cleaner mining and picking over the coal. The practice to-day was to run everything on a schedule basis and uniform heats. Any construction that could be heated would make coke; but the best results were obtained by skill in design on simple lines, and easy access to all parts.

Formerly the oven builders would guarantee 5000 cubic feet of 500 B.Th.U. gas per ton of coal; but he had seen a yield of 6250 cubic feet of 590 B.Th.U., and been credibly informed of a 6600 cubic feet make. These were only possible when leakage of air was absolutely prevented. The capacity of the ovens had now settled down to a standard of 13½ tons; the width varied from 17 to 22 inches, with a taper to facilitate discharge; the height was 10 feet; and the length 35 to 40 feet. The cost of an oven had increased from $7500 to nearly $20,000; but the working costs had been cut well below 60 c. per ton. An average coal (28½ per cent. volatile) and ordinary yield, 13½-ton oven, 18-hour charge, would figure-out, on a hundred-oven battery, to a daily expenditure of $5298 for coal (1766 tons at $3 per ton), the wages, repairs, depreciation, and repairs to $1331—total, $6629; and the receipts for residuals—tar (7 gallons per ton at 2½ c.), $309; sulphate of ammonia (1 per cent. at $60), $1060; gas (6000 cubic feet per ton) at 10 c., $1060; benzol (2¼ gallons per ton at 14 c.), $556; and toluol (0·3 gallon per ton at 15 c.), $79—total, $3064. This left the net cost of coke $3365, or $2·88 per ton on a 70 per cent. yield. The coke cost less than the coal, and was physically and chemically of uniform quality; and the day's yield of gas was 10½ million cubic feet. The quality was 550 B.Th.U. Fifteen-hour charges had been tried; but this required a degree of heat that might damage and shorten the working life of the oven. Eighteen-hour charges had proved quite a success.

England and Germany were, the author said, far ahead of America in the recovery of tar and ammonia; and theoretically the yields should be more than those above stated. The short-period charge prejudiced the yield; and as the chief consideration was coke, this matter had not received the attention it deserved. Fears had been expressed that after the war there would be a

slump in benzol; but he quoted figures to show that motor fuel alone would take all that they could make. There was some talk about the Government spending large sums on plant for obtaining nitrogen and nitric acid from the atmosphere; but he failed to see the necessity, as gas-works and coke-ovens were quite capable of meeting all the demand.

He had recently visited the Durham district in England, and the Düsseldorf district in Germany, and, with the above exception and the use of mixtures of blast and oven gases for power purposes, the engineering and the amount of production in the States were far ahead of European practice.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

Diluted Coal Gas.

SIR,—The fugitive and flickering "Will o' the Wisp of Uncarburetted Hydrogen" appears to have gone out in the mists of allusion and suggestions of practices unrelated to the authorized and systematic provision of extracts from coal-gas required to defend the safety and honour of the State.

Let us hope that for the future we shall have a more constant radiance from incandescent bodies to illuminate the paths of duty and sacrifice.

Norwich, July 27, 1916. THOS. GLOVER.

Temperatures and Extracting the Whole of the Phenols.

SIR,—I notice in your remarks on the Whitstable "Home-Made Dehydration Plant" (p. 150) that to distil tar at 200° to 218° C. is certainly not quite high enough to denude the tar of toluol. As toluene boils at 110° C., it would be interesting to know on what facts you make such a statement.

You also state that this temperature 200° to 218° C. is lower than that prescribed by the Road Board. I cannot find that in the "General Directions and Specifications" issued by the Road Board (second edition) a temperature is given at which the tar should be distilled.

July 30, 1916. B.Sc.

[It may be suggested to our correspondent that he read the experiences detailed in Mr. Frank Livesey's and Mr. R. Wardell's papers in the "JOURNAL" for Nov. 16, 1915, and Mr. E. V. Chambers' paper in the issue for Nov. 2, 1915. See also paragraph on p. 203 of this issue as to "Thinning Dehydrated Tar for Road Work."—ED. J.G.L.]

Prices for Tar.

SIR,—May I draw your attention to the price of crude tar [2¼d. to 2⅜d.] quoted in the last issue of the "JOURNAL" by your London correspondent. I should like to know where such prices can be obtained, as I have been trying for months, without success, to get 2d. If your correspondent will give me this information, I am willing to hand over to a charity to be named by you anything I receive over 2d.

THOMAS CLAYTON (OLDBURY), LIMITED,
FORRESTER CLAYTON, Director.

Brentford, W., July 28, 1916.

Gas Engineers and Contractors.

SIR,—If the proposal to form a National Gas Institution, admitting "traders" and "contractors," bears fruit, there is one means of guarding against the danger to which Mr. F. S. Cripps alludes, judging by the experience of other organizations.

I refer to affiliation with the Bribery and Secret Commissions Prevention League, to the mutual advantage of gas engineers and contractors and of those who labour to create and maintain a healthy public opinion about bribes and secret commissions, and to enforce the observance of the Prevention of Corruption Act.

SECRETARY OF THE LEAGUE.

9, *Queen Street Place, E.C., July* 24, 1916.

Tottenham District Light, Heat, and Power Company.—At the meeting next Saturday, the Directors will report that, for the half year ended June 30, the amount of profit, after paying all charges for interest and income-tax, is £19,703, and adding the sum of £2185 brought forward from the last account, there is available a total of £21,888, out of which the Directors recommend the payment of the statutory dividend of 7½ per cent. on the "A" stock, 5⅝ per cent. on the "B" stock, and 5 per cent. on the preference stock. This will absorb £21,599, and leave a balance of £289 to carry forward. Owing to the continued increase in the price of coal, freight, and labour, the Directors have been compelled to advance the price of gas by a further 5d. per 1000 cubic feet as from the Midsummer readings. The proprietors will have learned with very great regret of the death of the late Chairman, Sir Corbet Woodall, who was a Director for 33 years, during 19 years of which he was Chairman, and to whose unremitting attention to the welfare of the undertaking the Company is so deeply indebted. The Rt. Hon. Sir Daniel F. Goddard has been elected Chairman of the Company; and the vacancy on the Board has been filled by the appointment of Mr. Hubert Dynes Ellis. The Directors also regret to report the death of the late Secretary, Mr. E. Topley, who, by reason of his ability and zeal, as well as his devotion to the Company's service, was a most valued official.

REGISTER OF PATENTS.

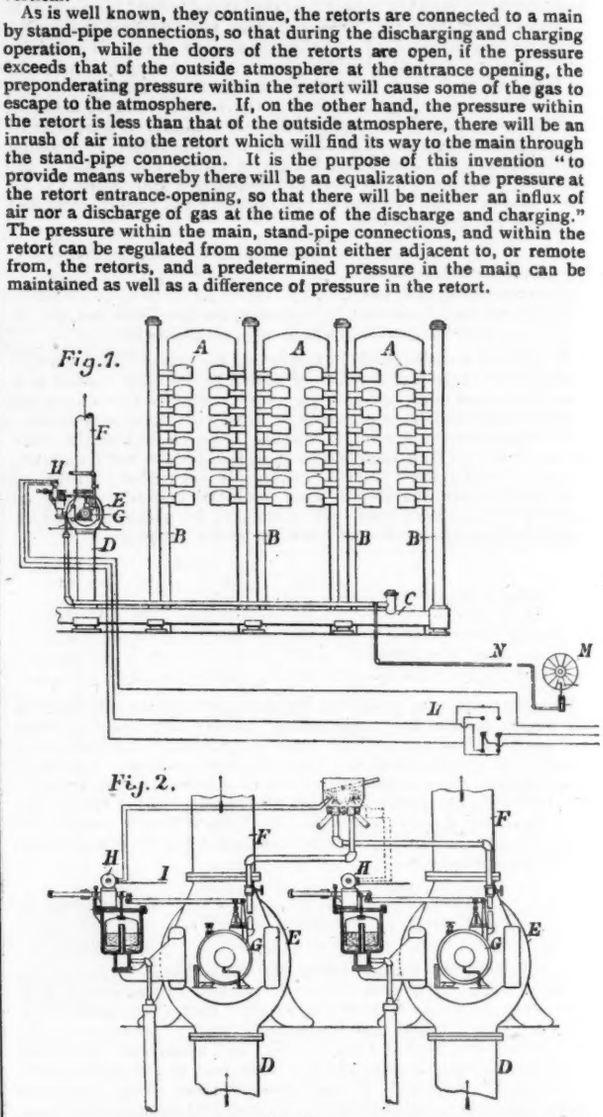
Pressure Control for Gas-Benches.

CARPENTER, H. A., and WARNER, A. W., of Sewickley, Allegheny, U.S.A., and the RITER-CONLEY MANUFACTURING COMPANY.

No. 4929; March 30, 1915.

In gas-making plants such as are contemplated in this invention, the patentees point out, it is a practice to so arrange the retorts that they are generally in vertical and horizontal alignment; and in the discharging and charging operation it is a common practice to discharge and charge all those in one horizontal row before charging those in another horizontal row. Thus, "for the purpose of this invention, the row may be considered as horizontal rather than vertical."

As is well known, they continue, the retorts are connected to a main by stand-pipe connections, so that during the discharging and charging operation, while the doors of the retorts are open, if the pressure exceeds that of the outside atmosphere at the entrance opening, the preponderating pressure within the retort will cause some of the gas to escape to the atmosphere. If, on the other hand, the pressure within the retort is less than that of the outside atmosphere, there will be an inrush of air into the retort which will find its way to the main through the stand-pipe connection. It is the purpose of this invention "to provide means whereby there will be an equalization of the pressure at the retort entrance-opening, so that there will be neither an influx of air nor a discharge of gas at the time of the discharge and charging." The pressure within the main, stand-pipe connections, and within the retort can be regulated from some point either adjacent to, or remote from, the retorts, and a predetermined pressure in the main can be maintained as well as a difference of pressure in the retort.



Carpenter and Warner's (Riter-Conley Company) Retort Pressure-Control Plant.

Fig. 1 is a diagrammatic view of a series of retort-benches having these improvements applied thereto. Fig. 2 is an elevation of a pair of exhausters, together with a switch employed to admit steam pressure to either exhauster at will, so as to cause them to operate, and to open and close the circuits leading to the motors controlling the operation of the exhausters.

The retorts A are arranged in vertical rows, each row connected to a main C through the stand-pipe connections B. The main C is connected by a pipe D to an exhauster E provided with an outlet pipe F for conveying the gas to the washer or any other plant. The exhauster is driven by a motor or steam-turbine G, operating under the control of an automatic governor device variably controlled by an electrically-operated regulator H. Wires lead from the regulator to any desired point, when a switch L can be installed. Adjacent to the switch is a pressure-gauge M provided with a pipe N having connection through the main C.

During operation, it is desirable that a certain predetermined pressure or a certain partial vacuum should be maintained in the main C at all times; and this pressure or vacuum is dependent upon the exhauster E, operated by the turbine G, the speed of which is controlled

by a governing structure variably regulated by a weighted valve mechanism to be presently described, and which may be operated from the switch L.

Because gas plants of this character are commonly operated over extended periods (sometimes during the entire twenty-four hours of each day), it is desirable that some means be provided to guard against a probable shut-down at any time; and to prevent this, a pair of exhausters (see fig. 2) is located adjacent to each other and both connected to the main C in a manner similar to the exhauster shown in fig. 1. Each exhauster structure forms an individual unit with its individual controlling mechanism; the connections between the mechanisms and the switch L being such that a single manual control mechanism may be employed for the regulation, operatively connected to either unit at will. By this arrangement the pressure control operator, who may be at any remote point, is not required to watch the individual operations of the working exhauster—the operator having charge of the exhauster operations shifting from one unit to the other as he may deem necessary.

As only one of the exhausters will be used at a time, means are provided for rendering one exhauster ineffective when the other is operated. For this purpose, there is provided a combined steam-valve device and electrical switch to be used in addition to the switch L. This device includes a pair of gate valves connected on one side to the source of steam pressure. The stems of the valves are pivotally connected to a lever, which, in turn, is pivoted at a point centrally located between the valve stems to a frame.

In apparatus of the character described, it is found that there is a difference in pressure between superposed retorts connected to the same standpipe, due to the fact that the outlets from the retorts to the standpipe are at different elevations. The pressures in the retorts of each horizontal row are, however, substantially the same. The pressure which is maintained in the main C will correspond substantially with the pressure in a particular horizontal row of retorts; but the pressures in the remaining rows of retorts will vary slightly above or below the pressure in the main. By referring to the gauge M the operator may determine the pressure in C, because the pressure in the pipe N in communication with the main will act on the piston within the casing, and the position of the stylus connected to the piston with respect to the chart of the gauge will indicate the pressure within the main and the pressure at the particular horizontal row of retorts.

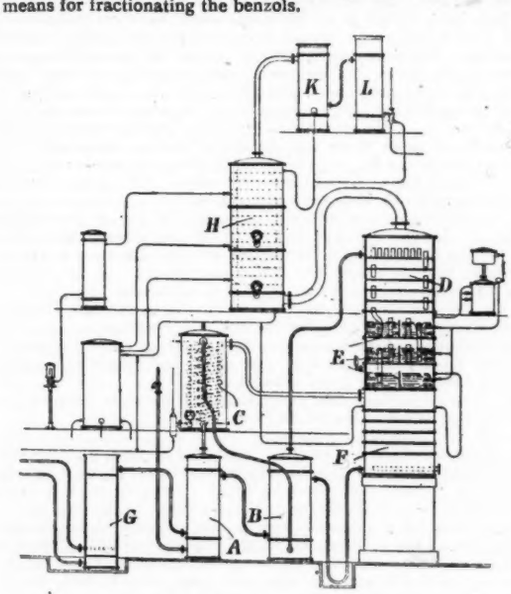
If it is desired to charge the retorts in any horizontal row, or to open one or more of the retorts in any row for any purpose, it is desirable, as explained, to bring the pressure in this row of retorts into substantial equilibrium with the pressure of the atmosphere. Now the operator, being aware of the pressure in the main and in the particular row of retorts, and knowing the difference in pressure between one particular row and the horizontal row of retorts to be opened, can modify the pressure in the main until the pressure or partial vacuum, as indicated by the gauge M, is such that the desired state of equilibrium is produced in the row of retorts to be opened.

Distilling Benzol, &c., from Wash-Oils.—No. 100,493.

BARBET ET FILS ET CIE., E., of Paris.

No. 7051; May 17, 1916. Convention date, Sept. 5, 1913.

This invention relates to plant for continuously distilling heavy oils which have been used for washing coke-oven gases, &c. It comprises means for distilling the benzols and the naphthalene in succession, and means for fractionating the benzols.



Barbet's Benzol Distilling Plant.

The oils, after passing through preheaters A, C, B, enter a column D, where the benzols are distilled by means of steam-coils arranged on the lower plates E. The oils, freed from benzols, then flow into a column F, where the naphthalene is distilled by an injection of superheated steam. The naphthalene vapours are condensed to a liquid in the condenser C (which serves also as a preheater), and the residues pass to the preheaters B A. The benzol vapours are led to a rectifying-column H, surmounted by an ordinary reflux device K L. Carbon disulphide and like volatile impurities issue from the cooler L by the pipe shown, and benzol fractions (benzene, toluene, xylol, &c.) are collected from the column H by other pipes, one of which is provided with branches whereby the heaviest fraction may be returned to the still F or be led to the pipe conveying liquid naphthalene from the condenser C, instead of being collected separately.

The distilling-column D comprises, in addition to the lower plates E fitted with steam-coils, a number of ordinary plates with hoods, and a top plate acting as a reservoir. The residual heavy oil issuing from the preheater A is cooled by direct contact with a counter-current of water in a cooler G filled with quartz.

Bauxite Residues for Purifying Gas.

RAMSAY, J. H., and LOWE, F. R., of Low Fell, Durham.

No. 10,935; July 3, 1915.

The patentees state that they have discovered that the compound of silica alumina and soda which is left as a residue after the extraction of alumina from bauxite can be decomposed by roasting at a moderate heat—say, 600° C.—with any carbonaceous matter such as coal, coke, coke breeze, or other forms of carbon, "thus rendering the alumina soluble and the soda available for recovery as sodium carbonate." After the roasting, the soda is extracted by lixiviation with water; the residue being then treated, if necessary, by means of sulphurous acid gas, when the alumina goes into solution as aluminium sulphite, and may be recovered as described in patent No. 9705 of 1915.

After recovery of the soda and alumina, the residue can be used for gas purification; the above treatment rendering it capable of absorbing sulphuretted hydrogen gas. Should it only be desired to use it for gas purification without recovering soda or alumina, heating the residue without carbonaceous matter to a temperature of 600° to 800° C. renders it highly absorbent with respect to sulphuretted hydrogen gas.

The proportions of carbonaceous materials to be added are as follows: 1 ton of residue requires 4 cwt. of carbonaceous matter containing 60 per cent. of carbon. The time of roasting is about four hours.

Regenerator Bricks or Tiles.

PAYNE, C. R., of Leeds, and LINSLEY, E., of Horsforth.

No. 12,279; Aug. 26, 1915.

This invention in regenerator bricks or tiles is "designed to facilitate the transmission of heat from the waste-gas flues of regenerator settings or any gaseous firing furnace."

The brick or tile is provided with two or more panels on each side, so that the transmitted heat from the waste gas is conveyed to the secondary air "with the least possible resistance." The brick is also provided with three rows of tongues and grooves on the bed, ends, and top, in order to prevent any short-circuiting between the waste-gas flues and the secondary air flues through the joints.

In a modification, the brick or tile may be provided with lugs or corbles to carry baffle-bricks or tiles supporting the regenerator.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for July 26.]

Nos. 9975—10,370.

AARTS, J. G.—"Distilling bituminous substances." No. 10,024.
AUSLOOS, A. L. M. J.—"Gas-stoves." No. 10,081.
BRADSHAW, G. D.—"Stove burners." No. 10,031.
BUSSEY, C. C.—"Extracting volatiles from coal, &c." No. 10,003.
DAVIS, H. N.—"Liquid fuel burners." No. 10,106.
FITZGERALD, S.—"Separating dust from gases." No. 10,115.
FLEISCHER, J.—"Gas heating stoves." No. 10,190.
HAEGELE and ZWEIGLE.—See Fleischer. No. 10,190.
HICKINBOTTOM, F.—"Gas-fires." No. 10,131.
LONGSTAFF, T.—"Manufacture of silica bricks." No. 10,330.
MACLAURIN, R.—"Separating low-temperature tars into components without distillation." No. 10,263.
MAYBURY, J. & W. G.—"Water stopcock box." No. 9976.
PARKINSON STOVE COMPANY.—See Hickinbottom. No. 10,131.
STURTEVANT ENGINEERING COMPANY.—See FitzGerald. No. 10,115.
TWIGG, W. R.—See Davis. No. 10,106.

Cleveland Water Company.—The half-yearly statement of accounts of the Company shows that, after providing for all expenditure during the half year ended June 30, there remained a balance of £5201. The Directors recommend that £3400 be used in the payment of dividends at the rate of 10 per cent. per annum on the "original" and "A" shares, and at the rate of 7 per cent. per annum on the "B" shares (less income-tax), and that £1801 be carried forward.

Colne Valley Water Company.—At to-day's (Tuesday's) meeting the Directors will report, for the half year ended June 30, that the profit in respect of the revenue account amounts to £14,177. The balance of the dividend and interest account, after paying the interest on the debenture and preference stocks, and transferring £1500 to the contingency fund, is £26,361. Out of this balance, the Directors recommend the payment of the full statutory dividends, at the rates of 10 and 7 per cent. per annum on the several classes of ordinary stock, and, in addition, a payment of 1 per cent. (actual) on account of back-dividends on the "A," "B," and "C" stocks, leaving £13,543 to be carried forward. At the beginning of the year, an issue of £20,000 of "D" ordinary 7 per cent. stock was made to meet capital commitments; and the whole sum was subscribed for at the rate of £125 per cent.—realizing a total of £25,000.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

The following further progress has been made with Bills:

Bill read the third time and passed: Local Government Provisional Orders (No. 7).

The Aberdare and Aberaman Gas Bill was returned from the Commons, with amendments, which were considered and agreed to.

HOUSE OF COMMONS.

The following further progress has been made with Bills:

Bills read the third time, and passed, with amendments: Aberdare and Aberaman Gas, Colchester Gas.

Bills as amended considered, and to be read the third time: Ferndale Gas [amendments made], Yeadon Water.

The Lords' amendments to the Tynemouth Corporation Bill were considered and agreed to.

On the third reading of the Yeadon Water Bill, Sir Hastings Duncan is to move that it be read the third time three months hence.

NEWCASTLE AND GATESHEAD GAS BILL.

The Unopposed Bills Committee of the House of Commons, presided over by Mr. WHITLEY (the Deputy-Chairman of Ways and Means), last Thursday sent this Bill forward for third reading.

Mr. H. R. CRIPPS (Messrs. Dyson and Co., Parliamentary Agents) said the Bill was promoted by the Newcastle-on-Tyne and Gateshead Gas Company, and was of a general character. It proposed to sanction certain extensions to the area of supply, made provision with regard to calorific testing, and there were certain special provisions as to both residual products and finance—the latter being the principal object of the Bill. Having regard to the financial position at the time that the Bill was promoted, the Company proposed to raise a large amount of redeemable debenture and redeemable preference stock. This, however, aroused considerable discussion on the part of the two Local Authorities concerned—Newcastle and Gateshead. The Bill as it came before the Committee was a result of the discussion that took place in this connection, and powers were now sought to raise £320,000 by redeemable and debenture stock. This sum, when added to the existing powers for debenture stock, would increase the total of debenture stock which the Company could issue to an amount greater than the proportion which it should bear to the total capital; and this was to be dealt with as a separate matter. The £320,000 redeemable stock asked for by the Bill was to be redeemed in 25 years by the issue of debenture stock in the ordinary way under the auction clauses; and thus the capital would be made to bear the usual proportion as between the different classes. With regard to residuals, the Committee were aware of the demand at the present time for the residual products of gas manufacture for the purposes of high explosives, and the promoters were naturally doing a considerable business in this way. They had therefore originally asked in the Bill for rather larger powers than were usually granted for dealing with residual products, not only from their own works but from others. This had been objected to by a large chemical manufacturer; but an arrangement had been made with him. Under the terms of the arrangement it was provided that during the continuance of the war the Gas Company should not be under the usual restrictions, but that these should come into force at the termination of the war—namely, that the Company should not buy from other companies or convert residual products to a greater extent than one-third of their own total output of residuals.

The CHAIRMAN asked if the Company at the present moment bought from other companies.

Mr. CRIPPS replied that they did not do so at present, but proposed to do so.

Continuing, Counsel explained the position with regard to the extension of area in the parish of Birtley. An agreement, he said, had been come to with the Birtley Colliery Company, who at present supplied gas to a number of the cottages and houses used by their employees; but the Newcastle Company now took over the whole of the supply by giving the necessary quantity of gas to the Colliery Company in bulk. The agreement was for thirty years, which admittedly was longer than is usual in such cases; but the amount of gas to be supplied and the money which the Newcastle Company would have to spend in order to give the supply, he thought, justified the long term.

Mr. E. MOON, K.C. (Speaker's Counsel), asked why the Company proposed to take so much land as 15 acres.

Mr. CRIPPS said that he had made inquiries and found that this was not necessary, and that 5 acres would be sufficient.

The preamble was then formally proved, and the Bill was ordered to be reported for third reading.

Street Lighting Allowance at Hull.—It was reported at a meeting of the Hull Corporation Works Committee that the British Gaslight Company had agreed to make a deduction of £1550 from their account of £5331 for street lighting for the half year ended June 30 last.

A Defective Gas-Tap.—At an inquest held at Dalton Brook, near Rotherham, on the body of a woman who was found insensible on the floor in her house, it was stated that the gas-tap was very loose, and could be turned right round. An india-rubber tube to a boiling-burner was disconnected. The gas was full on; but there was nothing over the ring to necessitate this. The Jury returned a verdict of "Accidental death."

LEGAL INTELLIGENCE.

SUCCESSFUL RATING APPEAL.

London Electric Supply Works.

The appeal of the Brompton and Kensington Electricity Supply Company, Limited, was heard by Mr. A. J. LAWRIE, the Deputy Chairman, at the London Quarter Sessions on Tuesday, Wednesday, and Thursday of last week. The assessment appealed against was a gross value of £22,800, and a rateable value of £12,000, placed upon the Company's works and mains in the Royal Borough of Kensington.

Mr. MacMorran, K.C., and Mr. Konstam appeared for the appellants; Mr. Ryde, K.C., with Mr. Whiteley represented the Kensington Assessment Committee. Expert evidence for the appellants was given by Mr. H. M. Carpenter (Messrs. Humphreys-Davies and Co.), Mr. Spencer Hawes (Messrs. May and Hawes), and Mr. E. T. Ruthven Murray, the Chief Engineer of the North Metropolitan Electric Power Supply Company. Evidence was also given by Mr. R. S. Downe, the General Manager and Engineer, and by Mr. Thomas J. Owens, the Secretary of the appellant Company. The respondents' witnesses were Mr. W. H. Eve and Sir John Snell.

After the hearing of three days, the Court decided to reduce the gross value from £22,800 to £19,778, and the rateable value from £12,000 to £11,378, and ordered the respondents to pay one-half the appellants' costs.

DAMAGES AGAINST A GAS COMPANY FOR TRESPASS.

At the Shoreditch County Court, last Thursday, before his Honour Judge CLUER, Edward Laxton, of 121, Tottenham Road, Southgate Road, sued the Gas Light and Coke Company to recover £10 10s. for trespass and wilful damage at his premises No. 148, Tottenham Road.

Mr. A. E. ROBINSON, for the plaintiff, explained that his client was the owner of No. 148, Tottenham Road, while he lived at No. 121. On May 13 the tenant went out of No. 148; and to prevent boys breaking windows or doing other damage, curtains were put up to make the place look occupied, and the gate was fastened up. On the morning of May 16, Mrs. Laxton saw the inspector of the Gas Company coming away from the house, and when asked what he wanted, said he had called to collect the money from the meter. She told him Mr. Laxton was out, and made an appointment for him to call at their house next morning, when he could have the key and get his money. Instead of that, the next day the inspector opened the gate, forced the sash of the window, got in, and opened the meter. When written to about the matter, a reply was received suggesting that the Company had a right to do as they liked. To repair the damage would cost 25s. But apart from this, it was a serious thing, as had not his client discovered the matter while the inspector was at it, he would have wondered if someone had broken into the premises.

Plaintiff bore this out. He denied that the inspector knocked at his door for the key. He had nailed down the sash of the window; so it must have been forced, as no fair usage would have got it open.

Mrs. *Laxton* also gave evidence that the inspector arranged to come for the key. The next day he did not do so, and noticing something peculiar at the house she went over, and found that he had broken in. He was very rude to her; and when asked by what right he had done it, he replied: "I have a right to go anywhere where the Company's money is." She said "And break in;" and he replied, "Yes." She had heard since there was £1 in the meter. Somebody came from the Company a few days afterwards; but she was quite certain there was no apology. What the representative did say was that they never authorized their inspectors to break in.

Mr. ROBINSON said the Solicitor for the Gas Company sent a letter offering 10s. for the damage, and £1 1s. in settlement of the alleged claim; but at the same time they made it clear that they considered the plaintiff had no claim, and the money would only be paid if a receipt was given that there was no legal responsibility.

Mr. OLIVER (for the Company): I should like to call your Honour's attention to the Gas-Works Clauses Act, 1871, section 21, as to the entry to buildings. I am not raising it as a defence; but I wish it to be in your mind that any officer may at all reasonable times enter. There is a penalty if this is not allowed.

Judge CLUER: It does not mean that if I go away, and shut my house, you may break in by the window.

Mr. OLIVER: I am not saying so.

Mr. *Pruden*, a collector to the Company, said he received intimation that the tenant had gone. He went there, and found the gate fastened by a piece of copper wire, which he lifted. Then he walked to the door, knocked, and got no answer. He went back to the gate and replaced the wire, when a woman came up, and inquired about the wire. He did not make the appointment for the key the next day. That was an absolute untruth. The next day he got the address of the plaintiff, and went down and knocked several times, and rang the bell, but got no answer. He went over to No. 148, opened the gate again, and on looking round found the window only needed lifting up by hand, which he did. He would not have forced it. He had done a lawful act, but said he simply raised the window.

Mr. *W. J. Dickson*, of the Gas Company, was then called, and said he saw the plaintiff and his wife, and apologized. He told them that what had been done was to prevent robbery.

Mr. OLIVER: You have a good many robberies?

Judge CLUER: And you are likely to have, so far as I can see. It is entirely your own fault for not collecting from the meters oftener. But that has nothing to do with an action for trespass.

Mr. OLIVER: I am not trying to justify, but only to mitigate the damages.

Mrs. *Laxton* was then re-called and said she had no bell. There had not been one there for fifteen years.

Mr. OLIVER, addressing his Honour, said they did not seek to justify the action of the man, as, needless to say, they would not authorize anyone to break into premises to clear a meter. This man definitely said he did not break in; that the window was not fastened.

Judge CLUER said this was an unjustifiable and unwarranted trespass, by an impudent and insolent servant of the Company. It was their business to know the character of man they employed; but he had not the slightest doubt they would keep him, and if they had to keep on paying it was their own fault. He emphatically said he was bound to accept the evidence of Mrs. Laxton. This man said he rang the bell many times, and there was not one to ring. The Company had employed a man whose trespass could not be justified in any way. He considered plaintiff was amply entitled to the damages he had claimed; and he was simply amazed the Company did not offer more than they did. His verdict would be for the plaintiff for £10 10s. damages.

Judgment was entered accordingly, with costs.

MISCELLANEOUS NEWS.

SULPHATE OF AMMONIA ASSOCIATION.

Second Annual Report.

The Executive Committee last Tuesday submitted to the subscribers the second annual report of the Sulphate of Ammonia Association, with which was incorporated the nineteenth annual report of the Propaganda Committee, together with a statement of accounts for the financial year ended June 30, 1916. The Executive Committee's report was as follows:

We are pleased to be able to state that the Association has extended the scope of its work in every direction, and has now come to be generally regarded as the representative and defender of manufacturers' interests in all matters germane to the production of sulphate of ammonia.

The Ministry of Munitions has constantly sought our assistance and advice upon general and technical questions; and we have, naturally, made every endeavour to meet its wishes in every way.

With the Boards of Trade and Agriculture, we have at times, unfortunately, found ourselves in disagreement. While we were unable to prevent these departments from enforcing a total prohibition of export during the spring months—thereby causing irreparable loss to the country and great inconvenience to manufacturers—the event has so far proved the soundness and correctness of the suggestions and estimates we offered them regarding the method of issuing licences and the quantities required by home agriculture as to predispose them favourably towards making more businesslike arrangements for the coming season.

Our efforts to secure a limitation of prices for sulphuric acid met with better success; and we think we may fairly claim that it was our action which led the Ministry of Munitions to fix the maximum prices now in force.

The activities of the selling branch have been considerably extended; the number of manufacturers who have entrusted us with the entire sale of their sulphate of ammonia has increased; and the quantity sold for other members has also increased, so that the tonnage disposed of during the year is very considerably greater than the total sales of last year. Apart from this, a large number of manufacturers who prefer still to retain sales in their own hands make a practice of consulting us before selling. The volume of business transacted directly with consumers has also increased—among the contracts secured being one with the French Government for the supply of sulphate of ammonia for munitions.

Weekly reports and lists of sales have been issued to members of the selling branch; and, in addition to this, we have from time to time circulated valuable information concerning matters affecting the trade with special reference to the increase in production of nitrogen in Germany.

We think we may claim, therefore, that the selling branch has continued to fulfil a useful function; and in support of this view we may point to the increase in the tonnage contributing to this branch from new members, amounting to 8228 tons. The total tonnage contributing to this branch now exceeds last year's by over 10,000 tons.

In our last report we drew special attention to the question of quality. Allowing for the difficulties experienced in obtaining the right qualities of sulphuric acid, we think that the effect of our pamphlets and suggestions is beginning to be felt, and that the quality of sulphate produced has improved on an average. There is, however, still room for further improvement; and we trust that all our members will make due preparation now, so that as soon as conditions are again normal they will be able to produce 25 per cent. sulphate of ammonia in good mechanical condition. We also wish to draw special attention to the desirability of employing strong bags of good outward appearance for home sales.

Members have shown a growing disposition to seek the assistance of our expert in the manufacture of sulphate of ammonia; and Mr. Clark has devoted as much time to our work as his duties with the Royal Naval Air Service allowed.

The work of the selling branch has been intimately associated with that of the propaganda branch; and, as foreshadowed in last year's report, greater attention has been devoted to commercial questions.

In accordance with the decision of the Propaganda Committee, certain alterations are being carried out in the organization of the outdoor staff with the idea of increasing the efficiency of the Association as a distributing agency without interfering with its scientific activities.

Our efforts to interest corn and manure merchants in sulphate of ammonia have met with marked success; and the steps which have been taken to maintain uniform prices over large districts for a month and more at a time have undoubtedly greatly assisted sales. The fact that the prices charged to farmers and manure merchants have been on an average about 30s. per ton below the export selling value is sufficient reply to our numerous critics in Parliament and elsewhere who have accused the Association of constituting a "ring" whose sole object is the forcing-up of prices.

From the figures and estimates obtained, we are able to report that the increase in the quantity of sulphate of ammonia used by home agriculture last season was over 10 per cent. in excess of the tonnage taken in previous years. Although this increase is not as large as we could have wished, we think that the result is satisfactory when the innate conservatism of farmers, the exceptionally bad weather, the reduction in the acreage of green crops, and the scarcity of labour are taken into account. Although the actual increased quantity used is not very large, we are convinced that a larger number of individuals than ever before have used sulphate of ammonia; and we confidently expect that this will form the basis for a large development in the future.

We may mention in particular that the autumn application of sulphate of ammonia to wheat has proved a great success in a large number of cases—thus proving that, generally speaking, our soils are more retentive than has hitherto been admitted by science. In recommending this, the Association undertook a somewhat venturesome step; and we wish to record our sense of obligation to the Board of Agriculture for lending us its support for the introduction of this novel practice.

FIELD EXPERIMENTS.

In conformity with the alteration of policy decided by the Committee, fewer manurial experiments have been carried out this season; the expenditure under this heading amounting to about half the sum spent last year. In future we intend to make fewer experiments but on larger areas, and with a view to solving particular problems, as we feel certain that our experimental work in past years has amply demonstrated the general value of sulphate of ammonia throughout the country. Farmers, indeed, generally appreciate its value, but confine its use to specific crops and times of application.

LITERATURE.

A large quantity of literature of all descriptions was distributed throughout the season. There were circulated 2000 copies of our brochure, "The Market for Sulphate of Ammonia and Its Future," dealing with the achievements and aims of the Association; and the demand for our complementary pamphlets, "Does it Pay to make 25 per Cent. Ammonia?" and "Suggestions for the Manufacture of High Testing Sulphate of Ammonia" created such interest that 4000 copies of each were distributed. All these issues met with a very cordial reception at the hands of subscribers and other manufacturers.

The propaganda branch issued pamphlets entitled "The Manure Richest in Nitrogen," of which 125,000 copies were circulated, and "Luxurious Growth," a highly illustrated pamphlet, of which 20,000 copies were sent out. In addition to this, 400,000 copies of a leaflet, "To Farmers," were circulated, mainly through corn and manure merchants early in January. A large number of the Board of Agriculture's leaflets advocating the use of sulphate of ammonia was also distributed.

With a view to facilitating the purchase of supplies by corn and manure merchants, classified lists of producers throughout the country were prepared, and there was a large demand for these. The demand for the pamphlet, "Artificial Manures for the Farm, Small Holding, and Garden," continues; and several thousand copies have been distributed during the season. As the circulation of this pamphlet was causing some offence to manure mixers, a slip has been attached advising buyers to apply to mixers for the manures advocated.

ADVERTISING.

In view of the restriction in the number of experiments, it was thought well to continue to advertise on a very extensive scale; and the expenditure under this heading has been slightly heavier than last year. Advertisements, articles, and insertions have appeared in twenty-two different agricultural journals; and a beautifully illustrated supplement dealing with the production and use of sulphate of ammonia was published by arrangement with "Country Life." We feel sure we shall reap the benefit of these efforts very soon.

In view of the shortage of supplies of sulphate of ammonia in the counties of Cornwall, Devonshire, Somerset, and in a number of Welsh counties, the Association arranged to pay part of the railway carriage from neighbouring centres of production; and a considerable quantity of sulphate of ammonia was sold in this way at a price which did not interfere with the sales of local producers. The Committee regard the money spent in this way as a good advertisement for sulphate of ammonia.

PATRIOTIC ROOT CROP COMPETITION.

Prizes amounting to £250 have been offered this season for the best crops of roots, cabbages, and potatoes. There have been printed 40,000 schedules advertising the competition. These are now in course of circulation. The results of last year's competition, which were highly satisfactory and formed an excellent advertisement, were published in the illustrated pamphlet "Luxurious Growth."

SCOTLAND.

The propaganda work in Scotland continues to be carried out by Mr. J. D. Young under the direction of the Sub-Committee composed of the Scottish members of the Propaganda Committee. The Scottish Office issued a very effective illustrated pamphlet dealing with the results of the best of the 205 experiments laid down—85 per cent. of the trials being successful. Prize competitions have also been held on turnip crops; a total of 192 plots being entered. The results achieved were excellent, and may be looked upon as valuable propaganda. A very effective exhibit was also arranged at the annual show promoted by the Scottish National Fat Stock Club at Edinburgh. Great interest was displayed in the Association's stand, the chief features of which were a display of farm and market garden produce and photographs illustrative of the season's field trials and of the process of manufacture of sulphate of ammonia. The photographs were, by request, presented

to the Edinburgh and East of Scotland College of Agriculture to form the basis of lectures and demonstrations. The rest of the work in Scotland has consisted in attendance at markets, distribution of literature and advertising; the total outlay amounting to £1581.

IRELAND.

Propaganda work has been carried out under the supervision of Mr. J. Irwin; and the successful results obtained from experiments in that country have been published in "Luxurious Growth." In view of the special arrangements made for home sales in England and Scotland, the Association received a very large number of inquiries from Irish merchants. The total sales to Ireland amounted to 750 tons; a considerable portion of this quantity being in lots of under 10 tons.

STAFF.

Of the District Supervisors, Messrs. Mosscrop, M'Ewan, Cattell, and Ettle have joined the Forces. Messrs. Chandler, Falconer, and Hooper May are leaving the Association's service in September. Messrs. Blackhurst and Coates have obtained exemption from military duties; and their services will be utilized in developing the commercial work of the Association among corn factors and manure merchants.

OVERSEAS PROPAGANDA.

Inquiries have been made with a view to commencing operations in India, Australia, the Argentine, and the Malay States; but owing to the difficulty of obtaining suitable men to supervise the experiments at the present time, no definite steps have been taken.

In Spain, the propaganda work has been continued on a larger scale; and sulphate of ammonia has been introduced into districts where it was unknown before. The sums expended on advertising have been increased; and about 30,000 copies of pamphlets on various crops have been distributed. No experiments proper have been made; but a quantity of sulphate of ammonia has been parcelled-out among small merchants in the new districts "on sale or return"—the total expenditure under this heading amounting to £360, most of which we hope will be recovered.

In Egypt the work has proceeded very satisfactorily under Mr. Georgiou's supervision. The Association has made an arrangement with Messrs. James Miller, Son, and Co., of Glasgow, with a view to providing a stock of sulphate of ammonia in that country until suitable local selling arrangements could be made. It is with pleasure that the Committee report that over 1000 tons have been shipped under this arrangement, the demand for this being a direct result of our propaganda work. An arrangement has now been made between Messrs. Miller and the Egyptian Markets, Limited, by which the extensive agricultural selling organization of the latter will be available for the sale of British sulphate of ammonia in Egypt. The agreement contains a provision that the Egyptian Markets shall afford the Association every facility for the carrying on of propaganda work; and we have every hope that this arrangement will be of great benefit to the Association, and lead to the permanent establishment of sulphate of ammonia in Egypt.

Experiments and propaganda work have been carried out on a large scale; and 25,000 copies of a pamphlet dealing with the manuring of maize and sugar cane, and containing the results of our successful Egyptian experiments, are now being distributed in English, French, and Arabic.

SUBSCRIPTION.

The tonnage represented by subscriptions to the propaganda branch—viz., 325,447 tons—shows an increase of about 1500 tons as compared with last year. To this must be added the production of several important manufacturers who have decided to join the Association as from the 1st of July, 1916. The total tonnage of new members is 11,000 tons.

We are very pleased to report that among the new members are the Bengal Iron and Steel Company, Limited, the Metropolitan Gas Company of Melbourne, and Natal Ammonium, Limited.

According to our revised estimates, the quantity of sulphate of ammonia as such produced in the United Kingdom amounts to about 360,000 tons per annum; so that the Association is very nearly completely representative of British production.

It is with deep regret that the Committee have to record the deaths of two of their colleagues, Mr. John Fyfe, of Young's Paraffin Light and Mineral Oil Company, Limited, and Mr. W. J. D. Burnyeat, of the Cumberland Coal Owners' Association. Mr. Fyfe had been an active member of the Executive since the formation of the Sulphate of Ammonia Committee in 1897. Mr. Burnyeat joined the Executive on the formation of the Selling Committee.

It is also to be regretted that the Committee no longer enjoy the co-operation of Mr. Blumer, who has retired from Messrs. Bolckow Vaughan and Co., Limited.

Messrs. Wood, Drew, and Co. offer themselves for re-election as Auditors to the Association.

D. MILNE WATSON, Chairman.

84, *Horseferry Road, Westminster, July* 17, 1916.

Price of Gas at Carlisle.—Considerable difference of opinion has manifested itself at Carlisle with regard to the price that should be charged for gas during the current year; and a special meeting of the City Council was held last Tuesday to consider the matter. A fortnight previously, the Gas Committee had recommended that the price be increased from 2s. 4d. to 2s. 9d. per 1000 cubic feet; but the Council sent the matter back for reconsideration. The Committee again made the same recommendation, the adoption of which was moved by Mr. J. P. Buck (the Chairman). Mr. Nicholson, moving an amendment that the price be 2s. 6d., asked why the Committee had not taken advantage of the Coal Prices (Limitation) Act. He said that on April 1 they had over 3000 tons of coal in store. Mr. White thought that 2s. 7d. per 1030 feet would meet the case. Mr. Cummings considered the Committee's recommendation the death blow to local municipal trading. Mr. Buck, in reply, said that if the Committee had taken advantage of the Coal Prices Act it would not have improved matters, but would have jeopardized the supply. After a long discussion, the Council decided to fix the price at 2s. 7d. per 1000 cubic feet to all consumers.

EDINBURGH AND LEITH GAS COMMISSIONERS.

Annual Accounts.

An examination of the accounts and other statistics of the Edinburgh and Leith Gas Commissioners for the year ended May 15 [approved at a meeting of the Commissioners on the 24th ult.] fully justifies the congratulatory remarks of the President of the meeting (Judge Lindsay). He stated that the results of the year's working "reflected great credit on the various heads of departments and officials, who had achieved them in the face of serious trouble in many ways."

Although the price of gas was increased last autumn from 2s. 8d. to 3s. 4d. per 1000 cubic feet, yet the quantity sold to private consumers and in bulk exceeded that of any previous year. Doubtless the great encouragement given by the Commissioners during recent years to the use of gas cookers, fires, grillers, &c., has had much to do with bringing about this happy state of things. Householders have found out since the war began, and servant and other domestic difficulties have accentuated, how very usefully and economically gas can be applied, and that the claims put forward on behalf of gas appliances have not been exaggerated. Owing, however, to the practical disuse of the street-lamps, and the restricted stair-lighting, the total quantity of gas sold (1,949,414,000 cubic feet) showed a decrease of 1·96 per cent. on the previous year, but an increase of 0·6 per cent. upon the estimated figure.

The following table, compiled from particulars given in the report of the Treasurer (Mr. A. Canning Williams), gives further details as to the sale of gas:

—	Year 1915-16.	Year 1914-15.	Increase (+) or Decrease (−).
	Cubic Feet.	Cubic Feet.	Cubic Feet.
Ordinary consumers	1,649,535,200	1,649,077,700	+ 457,500
Engines, &c.	133,020,100	120,411,500	+ 12,608,600
Prepayment consumers	108,301,400	97,884,500	+ 10,416,900
In bulk	3,382,800	3,035,500	+ 347,300
	1,894,239,500	1,870,409,200	+ 23,830,300
Stair lights	52,495,400	66,399,700	− 13,904,300
Public lamps	2,679,100	51,519,600	− 48,840,500
Totals	1,949,414,000	1,988,328,500	− 38,914,500

The very large falling-off in the street-lamp consumption compared with 1913-14 is strikingly shown when the figures are brought into juxtaposition—1913-14, 83,491,400 cubic feet; 1915-16, 2,679,100. A decrease of 97 per cent. in public lighting! There is no wonder that the Commissioners are considering the introduction of apparatus for lighting and extinguishing the lamps automatically [*ante*, p. 34], an arrangement which would permit of a resumption, probably on some modified scale, of street lighting, and also enable the Commissioners to extinguish the lighting quickly should military exigencies require it.

THE FINANCIAL RESULTS.

Turning now to the financial aspect of the year's working, it is seen that the income on revenue account amounted to £400,173, and the expenditure to £281,977, leaving a credit balance of £118,196, against £85,350 for the previous year. This balance has been disposed of as follows: In the payment of annuities, £27,076; interest and expenses on loans, £34,634; contributions to the sinking funds, £31,184; to the reserve funds, £19,424; carried forward (surplus), £5878. Two items of expenditure have special interest, arising as they do out of the war—viz., war service allowances, £6378, and air-craft insurance, £1182, the aggregate of them being equal to nearly 1d. per 1000 cubic feet sold.

WORKING STATISTICS.

From the informative statistics which follow the accounts, it may be noted that the make of gas per ton of coal and oil equivalent was 10,958 cubic feet, and that the unaccounted-for gas was 5·75 per cent.—the former figure showing a decrease of 47 cubic feet, and the latter an increase of 0·41 per cent. on 1914-15.

The cost of coal and oil equivalent per ton was 14s. 10·92d.—an increase of 2s. 4·16d. on the previous year. Residuals, however, yielded 9s. 9·42d. per ton of coal and oil, against 7s. 1·75d.—the improvement more than counterbalancing the increase in the cost of coal. This was the main reason why the net cost of gas (1s. 9·5d. per 1000 cubic feet sold) was only 0·52d. more than that in 1914-15. The number of consumers rose during the twelvemonth from 100,454 to 101,742; cookers on free loan from 17,735 to 18,445; and fires from 7309 to 8364. The number of hotplates, oven-burners, grillers, and boiling-rings is not given in the statistics; but in a report by the Engineer (Mr. Alexander Masterton) it is mentioned that at the end of May these appliances had reached the satisfactory total of 23,259.

WIDNES AND TOLUOL PRODUCTION.

The Town Council Come into Line.

A fortnight ago [*ante*, p. 122], it was reported that the Widnes Town Council, by ten votes to eight, had refused to sanction, despite a communication from the Ministry of Munitions, the erection of plant for the extraction of a larger percentage of toluol from the gas for the manufacture of high explosives. Developments quickly followed; a conference with Mr. F. L. Halford convincing members of the need for a reconsideration of their decision. The result was a special meeting of the Town Council last Wednesday, at which it was agreed, with only two dissentients, to rescind the former resolution, and to pass the recommendation of the Gas Committee that the Engineer (Mr. Isaac Carr) be instructed to obtain tenders for the erection of the toluol and

benzol plant referred to, and that the Committee be authorized to accept a tender and proceed with the work.

The MAYOR (Mr. J. Hedley) said that since the previous meeting certain information had been given to them in respect to this matter of the toluol plant. Some members of the Council, with the Chairman of the Gas Committee (Alderman H. S. Timmis), had been at an interview with Mr. F. L. Halford (representing the Ministry of Munitions), who told them that if they did not accept the proposal to a certain degree, they would be compelled to do so. He received them very favourably; and from the information he gave them the thing did not appear so bad on the face of it as it had done earlier. They had been led to believe they were going to lose 50 per cent. of the illuminating power of the gas; but Mr. Halford assured them that the fullest extent would be 25 to 30 per cent. They had been told they would lose 15 per cent. of the calorific value; but they were again told that 7 per cent. would be the extreme. They were also given to understand that they would be assured of sufficient gas to illuminate the works and operate engines for munition works. Alderman Timmis previously had an interview with Mr. Halford; and he had been so satisfied that he asked other members of the Council to meet him.

Alderman TIMMIS said it seemed to him that the rock upon which the Council had split was a statement in the report presented to the June Council meeting as to the reduction which would take place in the lighting and heating power of the gas. Mr. Halford said that at that time the figures were correct. The subject, however, was in an experimental stage; and it had been subsequently proved that the reduction necessary was very much less in actual practice. Moreover, Widnes was only required to take out as much toluol as possible gradually. As a matter of fact, Widnes was now not taking any more toluol out of the gas than had been taken for some years. They were not, however, getting the same quality of coal now as in pre-war times; and this had its effect on the gas. Mr. Halford had made it very clear that the toluol was absolutely needed. Mr. Carr had obtained the experience of a town which had been using the proposed plant for two months. He had found that the illuminating power of the gas was 16 candles. They had now reduced it to 12½ candles; and the calorific value had been 525 B.Th.U., and was now 500. Yet they had not received any complaints from any of their consumers, though it was a town where there were a large number of power users. The naphthalene nuisance, too, had disappeared. As a commercial proposition for the town itself, it was a good one.

Mr. MILLAR asked if he was correct in assuming that they would in Widnes recover 100,000 gallons of crude benzol per annum.

Alderman TIMMIS: That is so.

Alderman G. I. NEIL remarked that had the matter been properly put before the Council at the June meeting, it would have put a better complexion on things. He hoped the public would forgive them for opposing the scheme, and would believe they did their best.

Mr. G. DAVIES was prepared to go up to a point, but was not prepared to yield, because of the way the thing was being done.

Alderman T. SMITH said he hoped that, after all that had been put forward, they would appear to be what they always had been—"a loyal, law-abiding class of people."

BIRKENHEAD GAS MANAGERSHIP.

The Committee's Recommendation Referred Back.

A Special Meeting of the Birkenhead Town Council took place last Wednesday; and in the course of the proceedings, there was considerable discussion with regard to the appointment of a successor to Mr. T. O. Paterson as Engineer. The Council had before them the names of Mr. R. H. Brown (the Deputy Gas Engineer) and Mr. F. P. Tarratt (Engineer and Manager of the Darlington Corporation Gas-Works).

Mr. W. H. EGAN moved that the minute of the Gas Committee recommending these two candidates to the consideration of the Council be referred back for re-consideration. He disagreed with the name of Mr. Brown being submitted, and suggested that Mr. W. Doig Gibb should be asked to go to Darlington to inqure into Mr. Tarratt's credentials and report to the Council.

Alderman VAUGHAN seconded.

Alderman RUSSELL said they would like to feel that there would be no prejudice in the matter.

Alderman BYRNE thought it would be better to place all the names of the candidates before Mr. Doig Gibb, to enable him to make a recommendation.

Mr. FURNIVAL pointed out that to refer matters back would be tantamount to a vote of want of confidence in the Gas Committee.

Mr. NATHAN said it had got about that one man in the town was to get the appointment; and it was desirable to have assurance on this point.

Alderman CURPHEY remarked that it was in the Committee's power to make the appointment, subject to the Council's sanction.

Mr. WILLMER said he was one of those who had taken exception to the management of the gas undertaking; and he hoped an appointment would be made that would place this trading concern in a more favourable position. He agreed with the suggestion that the appointment should first be considered by Mr. Doig Gibb.

Alderman SOLLY said that, if they brought in an expert to report upon the appointment, they would be bound to follow his advice.

Mr. DODDS thought it was time some of the Corporation undertakings should be placed in fresh hands, or that new methods should be introduced.

On a vote, the amendment was carried by 17 votes to 15.

The Bingley District Council have accepted a recommendation of the Finance and General Purposes Committee that a war bonus of 2s. per week be granted to labourers at the gas-works whose weekly wage was 30s. or under. An amendment that such a bonus be granted to all weekly wage earners at the gas-works met with no support.

THE PAST YEAR AT TIPTON.

The Auditor of the accounts of the Tipton Urban District Council gas undertaking (Mr. J. E. Rowley), in his report to the Gas Committee on the working for the year ended March 31, states that the result, after payment of interest and instalments on loans, is a net surplus of £2967, as compared with a deficiency of £482 for the year before. The gross sales of gas amounted to £20,878, as against £17,230, an increase of £3648; and after allowing for discounts and adjustment for stock, the net total is £19,913, as against £16,276, an increase of £3637. The large rise in the sale of gas is chiefly due to the arrangement entered into with the Rowley Regis Gas Company for supplying gas to them; the amounts charged totalling nearly £1100. With regard to residual products, owing to adverse conditions, the receipts were less than usual for the year to March 31, 1915; and all now, with the exception of tar, show a large increase on the previous year's figures. The net total for residual products amounts to £8041, as against £5235, an increase of no less than £2806. It is mainly to this difference that the improvement in the profit is due. The charge for coal amounts to £11,627, as against £10,138, an increase of £1489. Owing to this increase the cost per ton carbonized works out at 18s. 10d., as against 16s. 1¾d. Repair and maintenance of works amounted to £2869, as against £1232. This increase is mainly due to the extensive repairs in connection with the resetting of the horizontal retorts.

From the gross profit of £7695 brought forward, an amount of £1566 has to be deducted for interest, and £3167 for reduction of loans. There is a net surplus of £2968 to be transferred to the accumulated profits account. At March 31, 1915, the balance to the credit of this account was £5323. Adding to this the £2968, the balance now is £8291.

In his manufacturing statement, Mr. William Prince, the Engineer and Manager, says that the quantity of coal carbonized was 12,354 tons, as compared with 12,562 tons in 1914-15, although the gas made shows an increase of 2·61 per cent.; the total being 157,329,000 cubic feet, as compared with 153,316,000 feet. In other words, the make per ton of coal carbonized was increased from 12,204 to 12,735 cubic feet. In neither year was any water gas added. The percentage of unaccounted-for gas was at the same time reduced from 11·08 to 8·23. The calorific value of the gas in the past year was 500 B.Th.U.; and the illuminating power, 15 candles.

MANSFIELD GAS UNDERTAKING.

Twelve months ago, the Chairman of the Gas Committee of the Mansfield Town Council reported a serious loss on the undertaking—the first for many years; but, dealing with the past year's accounts at the last meeting of the Council, he was able to announce that, though the cost of coal had been heavily increased, the undertaking showed a handsome profit.

The MAYOR (Mr. T. Smith), in moving the adoption of the annual report of the Gas Committee, said the figures were set out in such a way that they spoke for themselves. The net profit this year amounted to £1876, as compared with a loss last year of £1341. There were several items to which he would like to draw attention, particularly coal, as the market had been highly inflated. The expenditure on the manufacture of gas had been about £3450 more than in the previous year, coal having cost £3380 more, purification £439 more, and carbonizing wages, &c., £216 more. War relief and bonuses had swallowed up £619. Interest and sinking fund had taken £1079 more; and the increase on income-tax amounted to £241. On the other hand, they had saved on various items. Coke brought in an increased profit of £1986, sulphate £1205, and the revenue from gas £5250. The increased expenditure and decreased revenue amounted to £6373, and the increased revenue and decreased expenditure to £9598—leaving £3225 on the right side. The following were the details of the sale of gas during the year: Ordinary consumers, 97,329,400 cubic feet; prepayment, 87,957,100 cubic feet; public lamps, 3,960,000 feet; private lamps, 124,000 feet—total, 189,370,500 cubic feet. These figures indicated an increase of 1,201,900 cubic feet, or 0·63 per cent., when compared with the sale of the previous year. An advance of 6d. per 1000 cubic feet to ordinary consumers and 5d. to slot-meter users came into operation in the quarter commencing July, 1915. The average price of coal had been 17s. 8d. per ton, an increase of 3s. 1d. The Council would remember that they decided to try a local coal. They had had 6000 tons this year; and he was happy to say that it had proved so satisfactory that they hoped to enter into a bigger contract. The leakage was a serious matter, being returned as 17·8 per cent., or one-sixth of the gas they manufactured. He thought they would be able to show very different figures next year. Settlements in a colliery district were very disturbing to the mains. It was singular that the leakage was the same as years ago, when the late Mr. Arthur Graham took charge of the works. The last Manager allowed for the slot-meters containing the price of 2,000,000 cubic feet of gas, in drawing up his report; but Mr. J. Gibson (the new Manager) knocked this out of his statistics, or the result of the year's working would have been better by £300. During the year the market for coke and sulphate of ammonia had been good, and was likely to remain so in the current year; but there was no improvement in the outlook for tar.

Mr. MARRIOTT, while congratulating the Chairman of the Committee upon presenting such a very satisfactory report, said he thought they were entitled to more explanation about the leakage account.

Mr. J. P. HOUFTON congratulated the Chairman and the new Gas Manager on the excellence of the report presented. The only thing he would like to know was the quantity of gas sold. They showed they had made more; but had they sold more? He was pleased to find that the local coal purchased had proved so satisfactory. It was supposed that this coal was not good for gas-making purposes; but this idea had now been dispelled. He was told that coke made from the

coal was extremely good—better than any the Mansfield Gas-Works had turned out before.

The MAYOR explained that, as a matter of fact, they sold a less quantity of gas last year than the year before, owing to the leakage mentioned. He could give no further information in regard to the leakage account. It would do nobody any good to discuss it just now.

The report was adopted.

TYLDESLEY GAS AND WATER SUPPLY.

In his first annual report to the Gas and Water Committee, Mr. Mark Newsome, the Gas and Water Manager to the Tyldesley-with-Shakerley Urban District Council, states that the total receipts of the Gas Department for the year ended March 31 amounted to £9919, and the expenditure to £8124, leaving a gross profit of £1795. Against this, £2042 has been paid for interest and sinking fund charges, equivalent to 11·14d. per 1000 cubic feet of gas sold, leaving a net loss of £246 on the year's working, reducing the balance to be carried forward from £3101 (the previous year's figure) to £2854. When considering this adverse balance, it must be borne in mind that the increased receipts from residuals failed to cover the increased cost of coal by £219. Also there have been certain items of extraordinary expenditure. The total gas made was 56,491,000 cubic feet, all being coal gas. The decreased output was 3,625,000 cubic feet, as against an increase of 1,046,000 cubic feet last year. The make of gas per ton of coal carbonized was 10,915 feet, being an increase of 77 feet. There were 43,963,400 cubic feet of gas, a decrease of 5,943,000 feet, as against an increase of 823,000 feet last year. The heavy decrease is due to the restricted lighting orders, the earlier closing of shops, and the general economy practised by the ordinary consumers. The Summer Time Act will also reduce the ordinary consumption heavily before Oct. 1. The unaccounted-for gas is 20·6 per cent., as against 15·4 per cent. last year.

The accounts of the Water Department for the year show a loss of £70, as compared with a loss of £13 in the preceding year. The debit balance carried forward now amounts to £350. The loan outstanding at the commencement of the year was £3300. Of this amount £100 has been paid off. The consumption per head per day for domestic purposes was 17·5 gallons, against 16·9 gallons last year; and for trade purposes, &c., 6·27 gallons, against 6·9 gallons—a total consumption of 23·77 gallons per head per day.

ALLEGED PREFERENTIAL CHARGES FOR ELECTRICITY AT HACKNEY.

The Electricity Committee of the Hackney Borough Council report having had under consideration a communication from the Gas Light and Coke Company, intimating that their attention has been drawn to the printed scale of charges for the supply of electricity by the Council, and particularly to that part of it which provides for a reduced charge for energy supplied for lighting purposes to consumers who also use current for power. The Company have taken Counsel's opinion on the matter, and are advised that the reduced charge constitutes "undue preference." It was therefore a breach of sections 19 and 20 of the Electric Lighting Act, 1882, and consequently illegal. The Company, as large ratepayers in the borough, as well as in other ways, contend that they are considerably affected by this system of charge, and request that an undertaking should be given to discontinue the charge in question.

In view of the letter, the Committee state that they gave instructions for the opinion of Counsel to be taken as to whether the scale of charges or any part thereof constitutes "undue preference," or in any other way is beyond their statutory powers. As was anticipated by the Committee, Counsel advised, in a well-reasoned opinion, that there was no undue preference, and an intimation to this effect was forwarded by the Committee to the Company. The Company's Solicitors subsequently wrote that they had been consulted, and unless the Council desisted from making the charges complained of their clients would have no alternative but to commence proceedings. Upon receipt of this communication, the Committee caused representations to be made, while maintaining the position of the Council, that the present was not an opportune time for litigation upon a subject which had remained unchallenged and undisturbed for so long. It was suggested that the matter should remain in abeyance until after the conclusion of the war; but the Committee added that if proceedings were now commenced they would immediately apply for a "stay."

In reply to this, the Company's Solicitors intimated that their clients were only prepared to delay proceedings upon an undertaking from the Council not, during the continuance of the war, to offer to further consumers the scale of charges to which objection was taken. It was pointed out that the Company had no wish to harass the Council at this difficult time, and desired to express their appreciation of the friendly relations which had always existed between the parties. The letter, however, added that the charges to which the Gas Company object, and which they are advised are wholly illegal, are injurious to their business, and, further, unprofitable to the ratepayers' undertaking; so that should the Council be unwilling to give the undertaking asked for, the Company would have no alternative but to initiate proceedings against them.

In view of the strength, as they are advised, of the Council's position, the Committee do not see their way to recommend that any such undertaking as that required by the Company should be given; and they have recommended that, in the event of legal proceedings being taken by the Company, they be authorized to take all necessary steps to defend the action on behalf of the Council.

Fatal Explosion at Cleveland (Ohio).—A Reuter's telegram states that 24 persons have lost their lives at Cleveland (Ohio), as the result of a gas explosion in the water-works tunnel under Lake Erie. At the time the message was dispatched, rescue parties were endeavouring to save others.

MEXBOROUGH WATER-WORKS PURCHASE.

Arbitration Proceedings in London.

Arbitration proceedings, which occupied the whole of the week commencing on Monday, the 17th ult., took place at the Surveyors' Institute, Great George Street, S.W., to determine the price to be paid by the Mexborough Urban District Council for the undertaking of the Mexborough and District Water Company.

Mr. A. J. RAM, K.C., was the Umpire. Mr. E. BROUGH TAYLOR acted as Arbitrator for the Company, and Mr. JAMES DIGGLE, for the Council.

The Counsel engaged were Mr. E. HONORATUS LLOYD, K.C., and Mr. W. J. JEEVES (instructed by Messrs. Styring and Co.), for the Company; Mr. W. B. CLODE, K.C., and Mr. F. N. KEEN (instructed by Messrs. J. W. & H. Hattersley), for the Council.

THE COMPANY'S CASE.

Mr. HONORATUS LLOYD, in opening the case, explained that the proceedings were taking place under the Mexborough Urban District Council Act of 1914, which incorporated the Lands Clauses Act. The Company were to sell their undertaking with the exception of the cash balances (other than the consumers' deposits), all sums standing to the credit of the reserve fund, all undivided profits, all stock-in-trade and other stores of any description (which were to be purchased by valuation), all rents and profits and book and other debts due on credit or revenue account, and all rates accrued due on the date of transfer. In the year 1876, local gentlemen formed a limited liability Company with a view to providing a water supply for the district; and they obtained the Mexborough District Water Provisional Order of 1879. The share capital was not to exceed £10,000, without further authority; and the borrowed money, £2500. It was stipulated that the water supplied need not at any time be delivered at a greater height than could be reached by gravitation from the service reservoir or works authorized by the Order; and it was not required to be constantly under pressure. The scale of charges was to be based on the rack rent, or, if premises were not let at a rack rent, on the annual value. The rates were low under the provisions of the Order the Company were still working. Mexborough was situated in the Don Valley, some twelve miles from Sheffield and about half as far from Doncaster. The local industries were chiefly coal mining and glass-bottle making; and the inhabitants were largely, if not entirely, the working classes dependent upon these industries. In 1881, the population was 6319; in 1891, 7734; in 1901, 10,430; and in 1911, 14,401. In 1915, the population was estimated at 15,590; and of this number he believed about 90 per cent. were supplied with water by the Company. The water was derived from two wells connected together, which had been deepened from time to time as the demands of the consumers required. The Company were advised in 1913 that they must look for a further supply; and they therefore promoted a Provisional Order to authorize the raising of capital, and the carrying out of works by agreement. The Council opposed; and the Company decided to withdraw the application, and to promote a Bill in the following session for compulsory powers. They did deposit a Bill, by which they sought to be incorporated as a statutory Company, and asked for authority to raise capital and to carry out the necessary works. They had, in fact, entered into a contract with the life-tenant of an estate in the district, by which they were to have leased to them for 21 years the right to take water from two springs to the extent of 100,000 gallons a day, at 3d. per 1000 gallons, together with other rights. They, however, thought it was better to have compulsory powers; and therefore they sought in the Bill authority to take the water compulsorily. No opposition was offered to this either by the tenant or the trustees of the estate. The Council petitioned against the Bill, and presented one of their own for the acquisition of the undertaking. Negotiations took place, with the result that the Company's Bill was withdrawn, and that of the Council became an Act. At intervals over many years there had been negotiations between the parties for the sale of the undertaking; and in 1894 a price of £10,000 or £10,500 was actually agreed upon. The Local Government Board would not, however, sanction a loan of the amount the Council required, and so the matter fell through. Then, again, in 1903 Mr. W. Terrey, the Manager of the Sheffield Water-Works, was called in, and made a net valuation of about £12,000. This the Council were ready to pay; but the Company rejected it. The Company then set to work to carry out a duplication scheme advised by Mr. Terrey, in order to increase the stability of the concern. In 1914, other work was carried out, increasing the supply of water from the wells, with the result that the Company were no longer in the position of requiring further water in the near future. The water was pure, but hard. For the account year, the Company had taken the last year available up to the time of the Act—namely, 1913. Under ordinary circumstances, probably 1915 would have been the best year to take; but there was the war, which had materially affected the expenditure side of the account. However, Mr. Cash for the Company and Mr. Keen for the Council had put their heads together and agreed upon the figures, as figures. In fixing the number of years' purchase, it must be remembered that the Act was passed just on the verge of war. The Council could not pay now; so the Company were left in the meantime to carry on the undertaking under war conditions. When these conditions were over, and things were better, the Council would step in and relieve them of the concern. In these circumstances, he would ask the Tribunal not only to give the number of years' purchase that would be awarded were the money to be paid down, but also such number of years in addition as would fairly represent the risk the shareholders ran of having to re-invest at a lower rate of interest in the future.

Mr. CLODE pointed out that the Council had offered to postpone these proceedings until after the war.

Mr. HONORATUS LLOYD (continuing) said the available income now was £1437; and of this £1000 was divisible as the maximum dividend. In addition, there was a £2500 mortgage. Back-dividends amounted to about £15,000; and after payment of the current dividend and

interest, the Company would have a sum of over £300 a year free to go towards paying off these. He asked to be added to the capitalized dividend or loan capital £6200 for back-dividends.

Mr. *William Cash*, in answer to Mr. JEEVES, explained tables which he had agreed with Mr. Keen. He said that on the assumption that the rack-rent or annual value was equivalent to gross estimated rental. they had got out a calculation of the amount by which the revenue might have been increased had the Company charged on rack-rental, The increase was approximately £280. Mr. Keen, of course, agreed this merely as a figure, and not as a sum which had any bearing on the case. His own opinion was that the Company might have charged this additional amount. The balance of back-dividends due at the end of 1913 was £14,579.

Mr. CLODE (in cross-examination): The £280 not having been charged is not only not maintainable revenue, but it is not revenue at all?

Witness: It is not revenue to-day, in the sense that it has never been collected.

And never been made?—No; I say it has never been charged.

This was a Company not earning their maximum dividends. They had every inducement to make the highest charge they could?—I do not know that they ever appreciated the fact that they could have charged the extra sum. It might be a question of policy as to whether or not they should charge up to the hilt.

With average profits for the past seven years of £910 per annum, and for the past five years of £860—taking the figures simply as they appear on the accounts—do you suggest the Company could ever possibly, when they are in this condition, have anything with which to pay back-dividends?—It depends on many factors, some of which I do not know.

Re examined: In 1914, when the Bill was passed, they had exhausted all their capital, and had since had to get along by borrowing money from their bankers. This did not in the least alter the value of the undertaking, so far as earning capacity was concerned. The agreed figures showed that the gross income was increasing steadily. It was not fair with a water undertaking to take the average profit. One should look at the earning capacity of the concern which was handed over. It had been put to him by Mr. Clode that, while the income increased, the cost of earning it was growing in a higher ratio. As far as expenditure was concerned, they had to consider whether or not it was abnormal.

Mr. *William Matthews*, examined by Mr. HONORATUS LLOYD, gave details of the works. In 1914, the lowest driftway in the wells was made; and this had the effect of considerably increasing the supply of water. Now the Company had a margin over the requirements of the present population; and, therefore, they were in a position, with the existing works, to continue earning the revenue they had earned in the past. More water could be obtained from the wells, as there were as yet no headings in the ordinary sense. When this source was exhausted, there would still be plenty of water in the immediate vicinity—a lot of it rising to the surface in springs. The works were in duplicate throughout—one well pump being steam and the other electrically driven. The pumps to the reservoir were both steam. Each unit was capable of dealing with more than the maximum demand; the capacity of the lowest being 25,000 gallons per hour. There was a trace of iron in the water; and the whole of the supply was passed through sand filters. The district was supplied in two zones—from high-level tanks having a capacity of 90,500 gallons, and a reservoir of 100,000 gallons. About 40 per cent. of the water was pumped to the high level. There were in 1914 two periods of complaint of shortage of water, in July and October. He had investigated the matter carefully, and found that there was then no insufficiency of water available. In July, owing to the readjustment of the pumping apparatus, the supply was interfered with temporarily; but directly the difficulty was overcome, the tanks were filled up. The complaint in October was caused partly by the fact that the current supplied by the Council's electricity works varied to such an extent as to interfere with the machinery. Since then there had been no complaint, though the current was not by any means what it should be. He had prepared an adjusted account, based on the agreed income for 1913, of £2954; and in this, deducting the expenditure from the income, he arrived at a balance of profit of £1124. Adding to this £36 for supplies already taken on, the whole remuneration of which did not come into the year, and the £280 for possible higher charges (less bad debts 1 per cent.), gave an estimated annual profit of £1478. In capitalizing, he took first of all the £1000 which was the maximum dividend. At 22½ years, this came to £22,500. His profit of £1478, after payment of the maximum dividend and the debenture interest (£1112 10s.), left a balance of £324 available for the payment of back-dividends. This being so, the present value of the £15,000 of back-dividends he calculated at £6121, making, with the amount of the debentures and the £22,500, a total sum of £31,201, to which should be added such amount for compulsory purchase as the Tribunal might grant.

Mr. CLODE (in cross-examination): Can you account for the way in which the supply jumps up between 1909 and 1910? In your table the average daily supply for 1909 is 163,300 gallons; whereas in 1910 it is 203,230 gallons. Do you know anything to account for that?

Witness: Only that they were during the time reconstructing the pumping-station and installing new pumps. At such periods, of course, there would be a good deal of irregularity in the running of the machinery. Estimates up to 1914 were based on the best information he could get; but it was not satisfactory. He knew all about the figures for 1915, because the records had been kept under his own observation. The consumption per head he put as near as possible at 17 gallons. There were some 2-inch pipes; but they were practically all dead-ends. They served their purpose; but modern practice would have made them 3-inch. The well pumps were raised and lowered by a steam-winch, following the seasonal variations in the water; and for this purpose the Company had the finest overhead arrangement he had ever seen at such works. In fixing 22½ years' purchase, he had had regard to the uncertainty of the date of payment. If the Council could say they would be in a position within the next three months to complete the purchase, one could talk very much more easily about it. He would then have put 20 years' purchase.

Mr. KEEN (cross-examining): Is there any great difficulty in borrowing money which is not to go for the payment of wages, and so on?

Witness: You can get sanction for borrowing to repay other loans—merely taking the money out of one pocket and putting it in another. I am not aware of anything which would require the consent of the Treasury. The arbitration is taking place under an Act of Parliament which placed no limitation upon the borrowing of money, and prescribed the time at which the purchase is to be completed.

The UMPIRE: What about the Local Government Board?

Mr. KEEN: For paying the purchase-money for the undertaking, we do not have to go to the Local Government Board.

Mr. JEEVES: We will do our best to get this cleared up as far as possible, because obviously our case rests on the 2½ years, and 20 years apart from that. So far as we are concerned, we should prefer to take the 20 years now, as compared with the 22½ years in some unknown future, which may be good for us or may be wholly bad.

Cross-examination continued: In looking at the Mexborough Water Company, he did not think there were any elements of insecurity to take into consideration. The pumping charges had increased, but not largely. He could not agree that there were any risks of impurity which constituted an element of insecurity. The small mains were all right, and would not have to be increased in size in a district such as this. He did not admit there was anything wrong with the pressure.

Re-examined: There had been no complaint at any time by the Council or anybody else, of defective pressure.

At a later stage in the proceedings,

Mr. JEEVES, reverting to the question of the Council raising the necessary money, said he knew of two or three cases in which the Treasury had considered whether they would be prepared to sanction a loan at once; and in many instances they had done it. He had an example now—it happened to be the purchase of a gas-works, and not a water undertaking—in which a similar question arose. They first of all refused sanction, but ultimately gave it on pressure from the Local Government Board. He had to suggest that, if the Council desired to complete at once, they could no doubt get definite authority to borrow. If they did get it, the Company's case would be that they should have 20 years' purchase.

Mr. CLODE agreed that it would be better to have the whole question reduced to a certainty.

Mr. *W. V. Graham* in answer to Mr. JEEVES, said that he had been acting with Mr. Matthews in this matter since March of last year. He agreed that the supply from the site or the wells could be largely increased. It was a hard water, undoubtedly; but there were many waters as hard, or harder. It would be difficult to get a water in the district which was not hard. The works were practically new, and the machinery excellent. In fact, he did not think one could find a concern of this magnitude in a better condition. There was no risk of pollution of the water. With the valuation which had been put forward by Mr. Matthews, he was in agreement.

In cross-examination, witness said that really the pipes were adequate in size, though he would rather have them a little bigger. As a matter of fact, the 2 inch pipes, to which this remark principally applied, might be almost disregarded. They were in very short lengths, and supplied a small number of people.

Mr. CLODE: When you were considering the number of years' purchase, I rather understood you to say you found that all water undertakings depreciated?

Witness: All water undertakings are depreciated in capital value. The interest paid is high; but the capital value is depreciated.

Well, you would get a high rate of interest, would you not, if you invested in water undertakings?—Yes, undoubtedly, if you can find any stock to buy; but the difficulty is to find much. There is never a free market in water-works securities at any time; and since the war it has been more restricted still, owing to the depreciation in capital value. People will not part with water-works securities which are paying them a good rate of interest, and which, if they sold, they would have to sell at a great depreciation.

Re-examined: Instead of distributing the earnings in dividend, the works had been reconstructed at the cost of the undertaking in the last few years. In his opinion, £300 a year was amply sufficient to cover maintenance, repairs, and renewals of the works.

Dr. *Herbert Lapworth*, examined by Mr. JEEVES, gave evidence from a geological point of view, as to the unlikelihood of pollution of the wells. He estimated the daily flow of water which could be relied on as between 318,000 gallons as a minimum and 353,000 gallons as a maximum. This showed a considerable excess over the average demand in 1913 of 250,000 gallons a day. His calculations agreed fairly with Mr. Matthews's tests, which showed a yield of 340,000 gallons a day in the bad period of the year, with water low in the well.

The UMPIRE: Suppose the Company or the Council were thinking for the first time of sinking these wells just where they are now, and intended to pump up (say) 300,000 gallons of water a day, and they came to you and asked whether they were likely to run any risk of pollution from the cemetery, would you tell them to place the wells exactly where they are now?

Witness: I would not go so far as that. I should say: "If you can get a site anywhere round about, I should prefer it." If that were the only site, I should not hesitate to recommend it; but if there were an alternative, I should prefer the alternative.

Before the taking of further evidence, it was decided that the Umpire should, on behalf of both parties, approach the Treasury and the Local Government Board on the subject of the raising of the necessary money to complete the purchase.

Mr. *W. J. Burgess*, water analyst, then produced the results of tests showing the water to be satisfactory, except that it was hard. In respect of organic matter, he said, it approached some of the best supplies of the kingdom.

This completed the case for the Company.

As the result of explosions last Tuesday, followed by a destructive fire, at Camberwell, at the works of Meteorlite, Limited, acetylene-gas manufacturers, eight persons were admitted to hospital suffering from burns, and three have died.

COAL-GAS FUEL FOR MOTOR VEHICLES.

[From the "Commercial Motor," July 27.]

Possibilities connected with the use of ordinary coal gas as a fuel in motor vehicles which are fitted with ordinary internal-combustion engines must receive instant attention. We devoted our first leading article of last week [*ante*, p. 178] to this subject, and we then recalled one of our earlier reports and tests on the matter. We follow up this introductory summary with an expert article from the pen of Mr. W. A. Tookey, M.I.Mech.E., M.Inst.A.E., who examines the subject at greater length than we were able to do last week, and, of course, in a manner which will command the fullest attention. His essential data are in close agreement with those which we published. We doubt if it will surprise business-minded readers to learn that one important motor-bus undertaking in London is closely engaged at the present time upon negotiations with the South Metropolitan Gas Company in determining exact details for the adaptation of some of their motor omnibuses to suit the application of a system of the kind.

We have already postulated the necessity for the commercial-motor user to bear the cost of equipping each of his own vehicles with a battery of gas-bottles. The cost, for a 3-tonner, may be anything between £30 and £40; but this outlay will quickly be recouped by the high percentage economy which is assured on the use of ordinary coal-gas, as compared with petrol at ruling prices, and above all at prices which are likely to rule a few months hence. How much more, therefore, should the possibilities with coal-gas appeal to the owners of commercial motors who are not favourably classed by the Petrol Control Committee, and for whom it is not a question of relative costs, but of finding a fuel of which supplies are practically unlimited, at a time when they are deprived of all, or nearly all, their petrol? We are assured that, provided the steel bottles are subjected before installation to the usual tests to prove their strength, no Government or local regulations are in force which will hinder the development of this portative fuel-supply system.

The gas companies of the United Kingdom have a wonderful chance at their disposal. It is one which the writer is taking every step to enforce, apart from publicity in the "Commercial Motor," by direct representations to the British Commercial Gas Association. We are here concerned with potentialities which literally represent a colossal addition to the requirements for home-produced coal, with resulting production, not only of coal gas, but of all the usual distillation products, inclusive of benzol and ammonia, as well as of the carbon residual in the shape of coke. The writer of our special article points out that the normal requirements of 200 commercial motors, which should easily fall upon any individual undertaking in a city with a population of 100,000 or upwards, means a fresh sale of 67,000,000 cubic feet of gas to the yearly output, involving the carbonization of 6000 tons more coal. Each such extension of plant presages the production and marketing of, perhaps, 20,000 gallons of benzol.

We wish to emphasize, among our gas company friends, the fact that they are dealing with the gas in their gasholders, at their own works, and not with the gas after it has suffered main and other distribution losses. They are, in fact, asked to sell that which costs them about 1s. per 1000 cubic feet in the holders at anything between 2s. and 3s. per 1000 cubic feet, after compression, according to the scale of each particular contract for sale. Odd supplies, to odd callers, might very well be charged at the rate of 3s. per 1000 cubic feet, after compression. It is probable that compression plants will have to be laid down to yield charges at (say) three successive pressures; the final charge into the gas-bottles on the vehicles being delivered at 1800 lbs. per square inch.

Users must rouse themselves to the fact that conditions are abnormal; and gas companies must appreciate the differences between the present and future conditions and those which obtained when petrol was selling at 9d. or less per gallon. The ruling prices for petrol, and the prices which are likely to rule for an indefinite time to come, are such that the gas companies have held out before them the certainty of good trading profits, both upon the compressed coal gas and upon the additional yield of benzol which is involved.

We foresee all kinds of individual adaptations, not excluding the drawing of a light trailer behind each commercial motor upon which it is inconvenient to give up the space for the gas-bottles. Users are now concerned with making do, in order to "Keep the wheels of industry turning," to a degree of acuteness that has never before been experienced, although we hesitate to write that the ultimate degree of stress has yet been witnessed. Let them not "turn up their noses" at coal gas. It is a home product, derived from our own coal measures; and the cost of carrying about the cylinders is materially less than the savings which they should be able to effect in replacing petrol or any other available fuel by coal gas.

[It is announced that, at the instance of the British Commercial Gas Association, steps are being taken to bring this issue of the "Commercial Motor" before the engineers and managers of gas undertakings throughout the kingdom.—ED. J.G.L.]

[From the "Journal of Commerce," July 28.]

Many years ago, the writer carried out a number of experiments in the use of compressed coal gas as a fuel for petrol engines on motor vehicles. He satisfied himself that such a fuel could be used economically, and that no alteration was necessary to the engine other than the removal of the petrol carburettor and the substitution of a combined gas and air valve to regulate the supply of gas from a containing cylinder. The difficulties which then presented themselves were but three in number: (1) The supply of gas at a commercial price; (2) the great weight of the cylinders necessary to contain enough gas for a reasonable period of working; and (3) the partial dissociation of the gas within the containing cylinders if a given compression pressure be exceeded.

The first of these three objections could be overcome if gas companies would instal the necessary compressing plant. They could then supply gas at even a lower rate than that charged to ordinary consumers because they no longer would have a leakage factor such as exists with any extensive system of mains. The writer's experiments were carried out with gas compressed by the British Oxygen Company, at the resulting cost (including compressing and hire of cylinders) of about 5s. 5d. per 1000 cubic feet. Now is the time to go further into the matter. Gas companies are only too anxious to increase their output, not for the gas itself, but for the bye-products which are now of such value to the country.

The second objection is no longer a serious one. It is easily possible to provide enough storage capacity to run a 4-ton vehicle (without increasing its weight to a prohibitive extent) for at least twenty miles on one charge. This is further than the average steam waggon will travel without stopping to fill up with water; so why should not a "gas waggon" make similar stops for charging—provided a sufficient number of charging stations be established in any district. Of course, to a certain extent, it would limit a vehicle's scope to the area covered by the charging stations; but even then it would be in no worse circumstances than an electric vehicle.

With regard to the third objection, it is now possible to treat the gas in such a manner that dissociation is practically eliminated up to a pressure of 120 atmospheres.

Of course, the widespread adoption of compressed coal gas fuel for motor waggons is not a thing which is likely to take place suddenly. Much remains to be done before the vehicle user can count upon this fuel being a means of relieving the petrol shortage; but it is a practical problem, and capable of solution if dealt with by practical men. The subject was recalled to the writer by reading an article on the subject in the "Commercial Motor," which paper estimates that it should be quite possible to effect a saving of 2d. per mile run for a 4-ton lorry, based on the assumption that the compressed gas would cost a maximum of 3s. per 1000 cubic feet in the cylinders. It should be much less per 1000 feet in many districts—especially in Lancashire.

NOTES FROM SCOTLAND.

Wages Question again Raised in Edinburgh.—The National Union of Corporation Workers have again approached the Edinburgh and Leith Gas Commissioners on the wages question, and have asked for a conference. The Clerk has been instructed to give particulars of recent increases of wages, and to state that if, after a perusal of them, a conference is still desired, it will be arranged.

Effect in Edinburgh of the Summer Time Act.—The Summer Time Act seems to be affecting the consumption of gas in the Edinburgh and Leith Gas Commissioners' area; the quantity made from May 16 to June 30 being less by 16,172,000 cubic feet (9·28 per cent.) than in the same period last year.

Bo'ness Gas Company.—The annual meeting of the Bo'ness Gas Company, Limited, was held on Monday of last week, ex-Provost Ballantine presiding. The profit for the year allowed the usual dividend of 6 per cent., free of income-tax, to be paid, and £812 to be carried forward. The output of gas for the year amounted to 37,063,000 cubic feet, or an increase of 2,386,000 feet, equal to 6·27 per cent. The price of gas was reduced last January from 3s. 9d. to 3s. 4d. per 1000 cubic feet; and the Directors anticipate being able to continue this price during the coming year.

Coatbridge Gas Company.—The statement of accounts and balance-sheet of the Company for the half year ended June 30 has been issued by the Directors, who say they are pleased to report that they are satisfactory. The consumption of gas for the six months amounted to 122,950,896 cubic feet, being an increase of 9,102,630 cubic feet over the corresponding period. The unaccounted-for gas has been 7·85 per cent. The Directors, taking into consideration the fact that the annual contracts for coal, &c., are all fixed in June, have thought it advisable that the financial year should end at June 30, instead of Dec. 31, as they would then be in a better position to forecast results and fix the price of gas for the ensuing year. The gross revenue from gas, residual products, &c., amounted to £22,683. At the ordinary general meeting of shareholders, it is proposed to recommend the payment of dividends, in accordance with sliding-scale, at the rate of 10¾ per cent. per annum on the original stock, and £7 10s. 6d. per cent. per annum on the three issues of £10 shares, less income-tax. The Directors mention that Mr. Thomas Wilson, who has been Engineer and Manager of the Company for the past 35 years, retired from the position as at May 31 last; and the Directors unanimously appointed Mr. George Braidwood, who has been Assistant Manager for six years, to fill the vacancy—Mr. Wilson being retained as Consulting Engineer.

Annan Gas Company.—The revenue of the Annan Gas Company for the past year was £4843, and the expenditure £4329. A dividend of 6 per cent. has been declared, and the sum of £306 carried forward. The gas made amounted to 23,198,500 cubic feet, or an increase of 1,900,500 cubic feet over the previous year. Owing to increased cost of coals and higher wages of workmen, the price of gas has been raised from 2s. 10d. to 3s. 4d. per 1000 cubic feet.

A Town Council's Responsibilities.—The "Dundee Advertiser" says: The Dundee Town Council and their Gas Committee cut a ridiculous figure in the account their Gas Manager [Mr. Alex. Yuill] gives of his dealings with respect to the rate of wages paid to labourers at the gas-works. The Council, it appears, during the course of the past year, came to a resolution not to raise wages. Soon after, the labourers showed symptoms of unrest, and a disposition to seek employment elsewhere. The Manager adopted various measures to find the labour that was necessary if the community were not to be inconvenienced by an insufficient gas supply; and, in view of the fact that the wages were being raised in other gas undertakings, he found himself obliged to grant a corresponding advance to the labourers employed in Dundee. Probably this was, on its merits, a justifiable proceeding; but it was scarcely in order, as the Manager seems to be aware, for he explains that, while he never lost sight of the Council's resolution regarding the wages question, circumstances beyond control were against him, and "perhaps to have asked the Council to go back upon their considered

judgment so soon after it was delivered might have been injudicious." It would have been more judicious, on his part, to be so injudicious as to leave it to the Town Council to act in a matter for which they solely should be held responsible. Fearing that he may yet have more difficulties in the matter of work and wages, he recommends the appointment of a Special Committee, "with powers to deal with these matters as and when they arise." What is more needed than a Committee "with powers," is sufficient authority and volition on the part of the Council not to be creatures of "circumstances," but to control them.

Three Men Suffocated in a Holder.—The bodies of three workmen who had been suffocated were found at the bottom of a gasholder in the works of the Cassell Cyanide Company, Maryhill. The men were all in the employ of the Barrowfield Iron-Works; and they were sent to clean and repair the holder. Later they were observed on the top fixing a ladder by which they were to descend to the bottom. Subsequently, the men were not seen alive; and, not being employed by the Cassell Cyanide Company, their absence was not noted until the Barrowfield Iron-Works telephoned to ask if the men were engaged there. Supt. Hamilton, of the Maryhill Fire Brigade, with a respirator, had himself lowered into the holder, and recovered two of the bodies. At the third attempt, however, he was overcome by gas; and the third body was recovered by means of a rope and hook.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *July* 31.

There is very little of interest to report in the London tar products market. The prices last quoted are unchanged—namely, pitch, 20s. per ton; creosote, 4d. to 4⅛d. per gallon; crude tar, about 2½d. per gallon—all net and naked at sellers' works.

Sulphate of ammonia remains very firm, and makers will not accept less than £17 10s. per ton, net, and naked at sellers' works for delivery over the next few months.

Tar Products in the Provinces.

July 31.

There is very little business in the market for tar products. One or two sales are reported in pitch, and slightly better prices have been paid. Solvent naphtha is quiet, and sales are said to have taken place at slightly lower prices. Heavy naphtha keeps steady. Creosote is still very quiet.

The average values of gas-works products during the past week were: Gas-works coal tar, 15s. 9d. to 19s. 9d. Pitch, East Coast, 16s. to 16s. 6d. per ton; West Coast, 15s. to 15s. 6d. Manchester; 16s. to 16s. 6d. Liverpool; 17s. to 18s. Clyde. Benzol, 90 per cent., North, 10½d. to 11½d.; 50-90 per cent. naked, North, 1s. 3d. to 1s. 4d. Toluol, naked, North, 2s. 3d. Coal tar crude naphtha, in bulk, North, 6½d. to 6¾d. Solvent naphtha, naked, North, 1s. 8d. to 1s. 9d. Heavy naphtha, North, 1s. 2d. to 1s. 3d. Creosote, in bulk, North, 2¼d. to 2½d. Heavy oils, in bulk, 3⅞d. to 4d. Carbolic acid, 60 per cent., East and West Coasts, 3s. 4d. naked. Naphthalene salts, 75s. to 80s., bags included. Anthracene, "A" quality, 2d. to 2½d. per unit; "B" quality, nominally ⅝d.

Sulphate of Ammonia in the Provinces.

LIVERPOOL, *July* 29.

Owing to the necessity of now obtaining guarantees from buyers abroad that the sacks in which sulphate of ammonia is packed will not be re-exported from the country to which the goods are shipped, the market has become quieter this week, and at those ports where the advance was greatest some reaction has taken place; the quotations to-day being £17 7s. 6d. per ton f.o.b. Hull, £17 15s. f.o.b. Liverpool, and £17 17s. 6d. f.o.b. Leith. The forward position has been rather idle; but producers maintain a firm attitude, and still require a premium on prompt values.

Nitrate of Soda.

The market for this material is again somewhat easier, and quotations are now reduced to 17s. 9d. per cwt. for ordinary quality, and 18s. 3d. for refined, on spot.

Sulphate of Ammonia.

From another source, it is stated that to-day's prices for this article are as follows: Outside London makes, £16 12s. 6d. to £16 15s.; Hull, £17 10s.; Leith, £17 12s. 6d. to £17 15s.; Liverpool, £17 12s. 6d. to £17 15s.; Middlesbrough, £17 12s. 6d.

The will has been proved, at £17,886, of Mr. Laurence W. Simpson Rostron, one of the Directors of the South Metropolitan Gas Company, who died on May 14, aged 43.

"A Thousand-and-One Uses for Gas" for August consists of a second of the series of special laundry numbers, and deals with gas power for this purpose. There are included a comparison between suction and town gas and extracts from an article in the "JOURNAL" by Mr. H. C. Widlake, on "Displacing Electric Power for Laundry Work."

30-40 SERIES.

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Satisfaction-giving Cookers—"Main" Cookers—form the Main Spring, the force that maintains your sales in the Summer.

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SHOW-ROOMS AND BRANCHES: 25, Princes Street, Oxford Circus, W.; 136, Renfield Street, GLASGOW; 83, Old Market Street, BRISTOL; 18, Severn Street, Deansgate, MANCHESTER; 97, Millfield, BELFAST; 333, Queen Street, MELBOURNE; and 12, Cunningham Lane, Pitt Street, SYDNEY, N.S.W.

COAL TRADE REPORT.

Northern Coal Trade.

There is still a good deal of irregularity in the coal trade of the North. The prospects are, however, more decided than they were three weeks or so ago; buyers now being more desirous to place their orders, and prices being more settled. In the steam coal trade, the tone of the market seems stronger, and the forward prices are firmer generally. Best Northumbrian steam coals are from 42s. 6d. to 45s. per ton f.o.b., according to time of shipment; second-class steams are 38s. to 40s. per ton; and steam smalls are 25s. 6d. to 30s. per ton. But merchants have been of late offering below the colliery prices; and this has made the values still rather irregular. The business doing is in some measure of a "hand-to-mouth" kind. In the gas coal trade, there is a fair inquiry; and that for home requirements is now showing signs of increase. Best Durham gas coals are from 35s. to 35s. 6d. per ton f.o.b.; second-class kinds are steady at 33s. 6d. to 34s. per ton; and for "Wear Specials," the price is from 37s. 6d. to 39s. 6d. per ton f.o.b. The demand for gas coal is good on the long home contracts, and fair for export, especially to the French ports. Few new contracts seem to be in the markets. The "ascertained" or realized price for Durham coals is expected soon to give an increase which would lead to a further advance in the wages of the miners. Freights of gas coal to the south show very little alteration. To Mediterranean ports, the basis is steady at near 70s., Tyne to Genoa; but steamers continue rather scarce in most trades. Coke is generally firm. The demand is very full, especially for export, but also for some of the home munition works. Gas coke is still quoted at from 32s. to 33s. 6d. per ton f.o.b., according to quality and place of shipment. Freight on coke for Dunkirk is now about 40s. per ton from the Tyne ports.

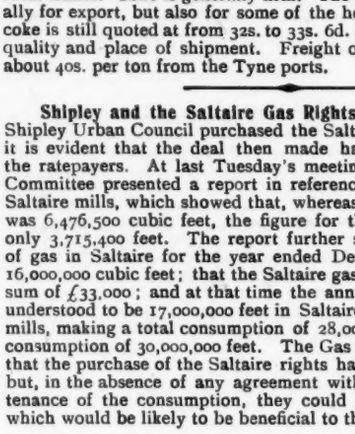
Shipley and the Saltaire Gas Rights.—Thirteen years ago, the Shipley Urban Council purchased the Saltaire gas supply rights; but it is evident that the deal then made has proved unsatisfactory to the ratepayers. At last Tuesday's meeting of the Council, the Gas Committee presented a report in reference to the consumption at the Saltaire mills, which showed that, whereas in 1915 the quantity taken was 6,476,500 cubic feet, the figure for the year to June 30 last was only 3,715,400 feet. The report further stated that the consumption of gas in Saltaire for the year ended December, 1915, was less than 16,000,000 cubic feet; that the Saltaire gas rights were acquired for the sum of £33,000; and at that time the annual consumption of gas was understood to be 17,000,000 feet in Saltaire and 11,000,000 feet at the mills, making a total consumption of 28,000,000 feet, with a probable consumption of 30,000,000 feet. The Gas Committee expressed regret that the purchase of the Saltaire rights had proved so unsatisfactory; but, in the absence of any agreement with a guarantee for the maintenance of the consumption, they could not recommend any action which would be likely to be beneficial to the Council.

A Horseferry Road Flower Show.

The spacious dining-hall at the chief offices of the Gas Light and Coke Company, in Horseferry Road, S.W., had its capacity taxed to the utmost on Saturday afternoon by the crowds of employees, and their wives and families, who were wishful to inspect the many hundreds of specimens of flowers, vegetables, and fruit on exhibition at the Company's third flower show. Entry was open to all employees of the Company (including staff officers); and there was a special war-time class open to dependants of employees who, having joined the forces, are absent from home. In all, there were 116 exhibitors; the total number of whose entries was 614. This was a large increase on the last show, which was held two years ago, when the number of entries was 404. Of the exhibits in general, it may be said that they afforded good proof of the industry and skill of the amateur gardeners in the Company's service—and also, incidentally, of the value of sulphate of ammonia as a manure. Six tastefully decorated tables formed one of the principal features; and if among the other exhibits a particular flower might be singled out, we would remark that there was an excellent display of carnations. One of the chief winners was Mr. C. E. Rider, of Kilburn, who had also been very successful in past years. The enjoyment of those present was added to by the Horseferry String Band, of eight performers, and by the hospitality which the Company plentifully provided. The judging was done by Mr. Horace J. Wright, F.R.H.S., with the aid (for the ladies' classes) of Mrs. Milne Watson and Mrs. St. Aubyn. The Committee (of which Mr. D. Milne Watson is Chairman) and the Joint Hon. Secretaries (Mr. W. J. Pepper and Mr. J. M. Smith) are to be congratulated on the successful outcome of their work.

Price of Gas at Penrith.—To meet an anticipated loss on the gas undertaking, owing to decreased consumption and increased expenditure, the Penrith Urban District Council are raising the price of gas from 2s. 8d. to 3s. 1d. per 1000 cubic feet; while there will be a proportionate reduction in the amount of gas supplied for 1d. through prepayment meters.

Manchester Municipal Trading Profits.—The Manchester City Council at their meeting to-morrow will be asked to reconsider the amounts which the trading departments of the Corporation provide in relief of the general rate. Alderman Ashton, a member of the Gas Committee, proposes to move: "That, having regard to the present high rate of income-tax, and to the liability thereto of the profits of the trading departments of the Corporation, a Special Committee of the Council be appointed to review the basis on which the Gas, Electricity, Tramways, and Markets Committees respectively have hitherto made annual contributions out of their profits in aid of the city rate, and to make such recommendations in regard thereto as they may consider desirable."



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Seville Water-Works Company, Limited.

The ordinary general meeting of the Company was held last Wednesday, at the London Offices, Laurence Pountney Hill, E.C. The Chairman (Mr. Cowley Lambert) presided. The report that he submitted for adoption showed that the income during the year ending March last amounted to £48,810. After deducting working expenses, the cost of laying on services, and the interest on debentures, the net profit for the year was £10,630, as compared with £11,286 the previous year. Adding to this sum the unappropriated profit at March 31, 1915—£17,929 4s. 5d —made a total of £28.559 to the credit of profit and loss account. After the payment of the preference dividend of £139, and the transfer of £4000 as a provision for over-expenditure on capital account, there remained a balance of £24,420 to be carried forward. The Board regretted the continued delay in carrying out the new works for the filtered river water supply, through the impossibility, owing to the war, of procuring the necessary capital in England. The Board offered 6 per cent. preference shares for subscription in Seville last year; but, notwithstanding the benefit which would accrue to themselves by the prompt carrying out of the new works, the people of the city had not seen fit to subscribe to the issue, and the completion of the project was thereby delayed. The Board, in their determination to keep faith with the Municipality to the best of their power, had devoted such sums as they could from revenue to the laying of the filtered water mains in the city. Under the circumstances, the Board regretted their inability to recommend the payment of a dividend for the year. In his address to the proprietors, the Chairman particularly referred to the disappointment felt over the apathy of the people of Seville in the matter of subscribing the necessary capital for the filtered river water scheme. He said more water was badly wanted, the people of Seville were anxious to make their city the most beautiful in Spain, and building was going on apace—yet the citizens would not provide the money, which could not be raised in this country during the war, for the purpose of completing the new works. The Chairman appealed to them to do so. The report was unanimously adopted.

Mr. Henry Lesser, the Secretary, forwards a copy of the report of the Committee of Management and the accounts for the year ended Dec. 31 last of the South Metropolitan Gas Company's Employees' Provident Society, every applicant for membership of which has been required to produce evidence that he is either beyond military age or unfit for service with the forces. There were at the end of the year 5292 members of the Society, which is, of course, approved under the National Insurance Act.

STOCK MARKET REPORT.

Business on the Stock Exchange last week was decidedly quieter, and movements were somewhat irregular and at times difficult to follow. The opening was fair, and the tone for the first half of the week quite cheerful. Then it took a turn the other way, and dulness prevailed up to the close. And this in spite of the daily successes of the Allies on both the Eastern and Western fronts, and of the easier condition of the Money Market. Thus prices, with but a few special exceptions, underwent a reduction. The gilt-edged division led the way, and War Loan and Consols eased-off. But Colonial issues held tight. In Home Rails, very little was doing, and so the tendency was heavy. Americans and Canadians were better off, as they rallied a bit just before the close. Argentinas moved irregularly. South Africans finished better than the worst figures of the week. The Foreign Market was about the firmest of the leading departments; French, Russian, Japanese, and Chinese being in good demand. Business in the Gas Market continued on quiet lines, as might be expected with the advent of August; but values remained quite firm, and bargains effected were at figures almost identical with those of the week before. Tottenham district accounts are out, and dividends at the full statutory rates of 7½ per cent. on the "A" stock and 5⅝ per cent. on the "B" stock will be recommended. The Money Market was hard at first; supplies being shortened owing to sundry factors, one of which was the large demand for Treasury Bills. The lack of lucidity in the phraseology employed by Mr. M'Kenna to announce the country's diurnal expenditure is still giving rise to perplexity. The Stock Exchange Committee, in anticipation of the Registration of Business Names Bill, have resolved that members of foreign birth who have changed their names since the outbreak of war shall give their discontinued names on documents connected with Stock Exchange business.

Bargains done for cash during the week were as follows: On Monday, Barnet 128, 128½, ditto "D" 101½, 102, Gas Light ordinary 78, 78¼, 78½, 79, Imperial Continental 99, 99½, 100, 100⅓, Primitiva preference 65s., 66s. 3d., South Metropolitan debenture, 59½, 59⅝. On Tuesday, Gas Light ordinary 78¼, ditto preference 75½, 75⅞, 76, ditto debenture 60, Imperial Continental 99, 99½, 100, ditto debenture 66, Primitiva preference 67s. 6d., Tottenham "B" 90⅛, 91. On Wednesday, Gas Light ordinary 78½, 78⅞, 79, 79¼, ditto preference 76, ditto debenture 60½, Imperial Continental 99, ditto debenture 66½, Primitiva preference 67s. 6d., South Metropolitan 86, ditto debenture 59⅜, 60, Tottenham "B" 92, 92½. On Thursday, Commerical 4 per cent. 74, ditto 3½ per cent. 71, European 13¾, Gas Light ordinary 78⅜, 79¼, 79⅛, ditto preference 75⅞, 76⅜, Imperial Continental 99½, Malta and Mediterranean 4¼, Primitiva preference 68s. 9d. On Friday, Croydon 175, 175½, ditto "E" 155, 155½, European 13⅜, 13¾, Gas Light ordinary 78⅛, 79, 79½, Imperial Continental 99, Primitiva preference 68s. 9d., 70s., South Metropolitan 83⅜. On Saturday, Brighton and Hove original 172, Gas Light ordinary 78¾, 79, 79⅛, ditto preference, 76⅛, ditto debenture 60½, 61, Imperial Continental 100, Primitiva preference 70s.

The Bank rate is 6 per cent.—as fixed on July 13.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S BARGAINS.

Issue.	Share.	When ex-Dividend.	Previous Div'd or Interest & Bonus.	Last Dividend.	NAME.	Closing Prices, July 30, 1914.	Yield on Highest Closing Price. £ s. d.	Lowest and Highest Prices of Bargains.
£			p.c.					
175,472	Stk.	Mar. 10	4	4	Aldershot 4 p.c. Pref.	..	—	..
1,551,868	,,	April 8	2½	5	Alliance & Dublin Ord.	59—64	8 18 3	..
874,000	,,	July 10	4	4	Do. 4 p.c. Deb.	76—79	5 1 3	..
280,000	5	April 29	7½	3/-	Bombay, Ltd.	5⅞—6⅜	8 17 8	..
50,000	10	Feb. 26	16	15/-	Bourne- 10 p.c.	29—30	6 6 8	..
383,110	10	,,	7	7/-	mouth Gas B 7 p.c.	15—15½	4 10 4	..
115,000	10	,,	6	6/-	and Water Pref. 6 p.c.	13½—14	4 5 9	..
153,740	—	—	—	4	4 p.c. Deb.	..	—	..
992,045	Stk.	Feb. 26	†14	£6/-	Brentford A Consold.	361—366	5 5 3	..
734,920	,,	,,	†11	55/-	Do. B New	204—209	5 5 3	..
55,000	,,	,,	5	5	Do. 5 p.c. Pref.	109—111	4 10 1	..
221,400	,,	June 11	4	4	Do. 4 p.c. Deb.	91—93	4 6 0	..
217,380	Stk.	Feb. 26	11	10⅔	Brighton & Hove Orig.	208—218	5 8 4	172
344,200	,,	,,	8	7⅔	Do. A Ord. Stk.	154—159	5 0 8	..
630,000	20	Mar. 26	12½	22/6	British	44—45	5 11 1	..
120,000	Stk.	June 26	4	4	Do. 4 p.c. Deb. Stk.	88—90	4 8 11	..
945,771	Stk.	June 26	4	4	Buenos Ayres 4 p.c. Deb.	85—87	4 12 0	..
100,000	10	—	—	—	Cape Town & Dis., Ltd.	1½—2½	—	..
100,000	10	—	—	4/6	Do. 4½ p.c. Pref.	4—6	—	..
100,000	Stk.	June 26	4½	4½	Do. 4½ p.c. Deb. Stk.	70—75	6 0 0	..
157,150	Stk.	Feb. 26	5	5	Chester 5 p.c. Ord.	108—110	4 10 11	..
1,513,280	Stk.	Feb. 12	5/9/4	49/4	Commercial 4 p.c. Stk.	106—108	5 1 3	74
560,000	,,	,,	5½	46/8	Do. 3½ p.c. do.	103—105	5 1 6	71
475,000	,,	June 11	8	8	Do. 3 p.c. Deb. Stk.	69½—71½	4 8 11	..
800 000	Stk.	,,	4	—	Continental Union, Ltd.	76—79	5 1 3	..
200 000	,,	,,	7	—	Do. 7 p.c. Pref.	115—118	5 18 8	..
278,400	—	—	—	11½	Croydon B and C 7 p.c.	..	—	175—175½
—	—	—	—	—	Do. E	..	—	155—155½
472,270	Stk.	—	6	5½	Derby Con. Stk.	128—135	4 16 0	..
55,000	,,	—	4	4	Do. Deb. Stk.	102—104	3 16 11	..
1,092,180	10	July 29	10	10/-	European, Ltd.	17½—18	5 11 1	13½—13½
16,318,430	Stk.	Feb. 10	4/17/4	42/-	Gas 4 p.c. Ord.	98—102	4 15 6	72—79½
2,600,000	,,	,,	5½	5½	Light 3½ p.c. max.	76—79	4 8 7	..
4,062,235	,,	,,	4	4	and 4 p.c. Con. Pref.	96—99	4 0 10	75½—76½
4,674,850	,,	June 11	3	3	Coke 3 p.c. Con. Deb.	73½—74½	4 0 6	63—61
130,000	,,	,,	10	10	10 p.c. Bonds	..	—	..
258,740	Stk.	Mar. 12	5	4½	Hastings & St. L. 3½ p.c.	87—89	5 12 4	..
70,000	10	April 29	11	6	Hongkong & China, Ltd.	16½—16¾	5 11 4	..
86,600	—	—	—	9½	Hornsey 7 p.c.	..	—	..
121,000	Stk.	Mar. 12	7⅞	7½	Ilford A and C	151—154	5 2 4	..
65,780	,,	,,	6⅜	5⅞	Do. B	115—119	5 8 0	..
65,500	,,	June 26	4	4	Do. 4 p.c. Deb.	92—94	4 5 1	..
4,940,000	Stk.	May 14	9	4½	Imperial Continental	150—160	5 12 6	99—100½
1,235,000	Stk.	Feb. 12	3½	3½	Do. 3½ p.c. Deb. Red.	84—86	4 1 5	66—56½
235,342	Stk.	Mar. 12	6½	6½	Lea Bridge Ord. 5 p.c.	211—213	5 7 5	..
2,498,905	Stk.	Feb. 26	10	5	Liverpool 5 p.c. Ord. {A	146—148	4 14 7	..
					{B			
306,083	,,	June 26	4	4	Do. 4 p.c. Pr. Deb. Stk.	..	—	..
75,000	5	June 11	6	2/-	Malta & Mediterranean	4¼—4⅜	6 9 9	4½
250,000	100	April 1	4½	4½	Met. of Melbourne 4½ p.c. Deb.	99—101	4 9 1	..
541,920	20	May 28	4	6/-	Monte Video, Ltd.	11½—12	6 13 4	..
1,875,892	Stk.	July 29	4½	4½	Newc'tle&G'tesh'd Con.	98½—99½	4 10 6	..
629,705	Stk.	June 26	8½	8½	Do. 3½ p.c. Deb.	82—83	4 4 10	..
55,940	10	Feb. 26	7/14/0	7/6⅔	North Middlesex 7 p.c.	14—15	5 2 8	..
300,000	Stk.	May 14	8	8	Oriental, Ltd.	117—122	6 11 2	..
60,000	5	Mar. 26	10	1/-	Ottoman, Ltd.	7⅛—7⅜	6 9 0	..
60,000	50	Feb. 26	12	65/-	Portsea, Island B	128—131	4 19 8	..
100,000	50	,,	12	60/-	Do. C	118—121	4 19 2	..
52,000	50	,,	10	—	Do. D	..	—	..
249,980	5	April 29	8	—	Primitiva Ord.	5¼—6	6 12 4	..
499,960	5	June 26	5	2/6	,, 5 p.c. Pref.	4⅞—5	5 0 0	65/—70/-
531,600	100	June 2	4	4	,, 4 p.c. Deb.	91—93	4 6 0	..
—	—	—	—	4	,, ,, ,, 1911	..	—	..
346,198	Stk.	June 26	4	4	River Plate 4 p.c. Deb.	85—87	4 12 0	..
150,000	10	May 14	6	6/-	San Paulo 6 p.c. Pref.	10½—11	5 9 1	..
125,000	50	July 1	5	5	5 p.c. Deb.	47—49	5 2 0	..
135,000	Stk.	Mar. 12	10	10	Sheffield A	223—224	4 9 8	..
299,984	,,	,,	10	10	Do. B	222—224	4 9 8	..
538,500	,,	,,	10	10	Do. C	220—222	4 10 1	..
90,000	10	May 28	9	6/-	South African	10½—11½	7 16 6	..
6,609,895	Stk.	Feb. 10	5/4/0	44/-	South Met., 4 p.c. Ord.	111—113	4 16 8	88⅜—86
1,895,445	,,	July 10	3	3	Do. 3 p.c. Deb.	72½—74½	4 0 6	59½—60
224,820	Stk.	Feb. 26	8½	8	South Shields Con. Stk.	157—159	5 6 11	..
952,795	Stk.	Feb. 26	6	48/4	S'th Suburb'n Ord. 5 p.c.	114—116	5 3 5	..
60,000	,,	,,	5	5	Do. 5 p.c. Pref.	110—112	4 9 3	..
145.000	—	—	—	48/4	Do. West Kent.	..	—	..
187.558	,,	June 26	5	5	Do. 5 p.c. Deb. Stk.	116—118	4 4 9	..
647,740	Stk.	May 14	5	5	Southampton Ord.	99—102	4 18 0	..
190,000	Stk	Feb. 12	7½	7½	Tottenham A 5 p.c.	135—138	5 8 8	..
782,275	,,	,,	6	6	District B 3½ p.c.	115—117	5 2 7	90½—92½
181,255	,,	June 26	4	4	4 p.c. Deb.	87—89	4 9 11	..
182,380	10	Dec. 30	5	—	Tuscan, Ltd.	5—6	8 6 8	..
149,900	10	July 1	5	5	Do. 5 p.c. Deb. Red.	93—95	5 5 3	..
295,476	Stk.	Mar. 12	5	5	Tynemouth, 5 p.c. max.	108½—109½	4 11 4	..
					Wandsworth, Wimbledon, and Epsom—			
80,000	Stk.	Feb. 26	8¾	78/9	Wandsworth A 5 p.c.	151—156	5 7 4	..
255,686	,,	,,	6¾	68/9	,, B 3½ p.c.	129—134	5 2 7	..
108,075	,,	,,	5/17/8	55/1½	,, C 3½ p.c.	110—115	5 1 0	..
352,000	,,	,,	6½	57/6	Wimbledon 5 p.c.	117—122	5 0 5	..
98,000	,,	,,	6¾	63/9	Epsom 5 p.c.	121—126	5 5 2	..
98.416	,,	June 26	3	3	3 p.c. Deb. Stk.	66—69	4 6 11	..

† Paid on Old 10 p.c. and 7 p.c. Standard Stocks.

Gas Profits at Clitheroe.

Mr. R. Barrett, the Manager of the Clitheroe Corporation Gas-Works, in his report for the year ended March 25, stated that the amount expended on capital account was £644; the gross revenue for the twelve months being £14,679, and the gross expenditure, including annuities, interest, and sinking fund, £10,602. The profit was £4076, or an increase over the previous year of £1343; while the net profit was £1968, an advance of £1318. The price of gas was increased 6d. per 1000 cubic feet on June 24; the receipts amounting to £10,506, compared with £8994 the previous year. At the Town Council meeting, the Chairman of the Gas Committee (Mr. W. W. Whiteside) remarked that the report was more satisfactory than he had dared to hope. On the strength of it, several members seemed inclined to reduce the price of gas. He thought it would be a great mistake. Last year the Manager bought coal at an advantageous price; and though an advance of 6s. per ton was made early in the year, they did not start to use the dearer coal until November. They would now begin to feel the full effects of war prices; and the coal required during the next twelve months would cost them £1400 more than last year. The estimated increase in expenditure this year was £2170. Mr. Musson said that, by reducing the price of gas, they would be carrying out the wish of the Government, which was that private consumers of coal should save their stocks and use gas for the production of heat. There was no doubt that if the candle power were reduced there was a very fair prospect of making cheaper gas.

Chelmsford Gas Purchase Arbitration.—The Chelmsford Gas Company having declined an offer which the Town Council decided should be made to them for the purchase of the undertaking, the Parliamentary Committee have, on the advice of Counsel and the Corporation's expert engineers, directed the Town Clerk to inform the Company that the Corporation are not prepared to make any further offer. The Town Clerk has also reported that the Arbitrators have appointed Mr. J. H. Balfour Browne, K.C., to act as Umpire in the arbitration to determine the price to be paid for the undertaking; and that the proceedings have been postponed to the beginning of October.

Visit to the Belfast Gas-Works.—Members of the Belfast Association of Engineers who visited the gas-works last Saturday week, were much interested in the Glover-West vertical retorts. In the absence of Mr. J. D. Smith (the Engineer and Manager), the visitors were received by Mr. A. M'Ivor Cleland (District Superintendent); and they were informed that the vertical retort section, which was completed some nine months ago, occupies a ground space of 6100 square feet, and comprises 80 retorts, each making 34,000 cubic feet of gas in the 24 hours, or a total of 2,700,000 cubic feet. For a production of 2,500,000 cubic feet of gas, 304 horizontal retorts were required, each producing 8200 cubic feet—the total occupying a ground space of 13,000 square feet. The advantage derived from the adoption of the vertical retort system does not, of course, end with the great saving of ground space; for where thirteen men were required at the horizontal retorts, only one man is engaged at the vertical retorts.

Price of Gas at Brighouse.—The Brighouse Gas Committee have given public notice that, owing to the advances in the cost of coal and other increased costs, it may be necessary to advance the charge for gas by 3d. per 1000 cubic feet at the end of December.

The Halifax Gas Committee have received a communication from the Ministry of Munitions in regard to the growing need for the supply of benzol and toluol; and they are urged to instal, at the earliest possible moment, plant for this purpose. The matter has been referred to a Sub-Committee, with power to act.

An indication of the active campaign which is being conducted by the London Coke Committee is to be found in the fact that they are increasing their advertising in directions that seem promising. A prominent advertisement of theirs which should yield good results is noticed in the July number of "The Power Laundry."

We learn from the Company's Agents, Messrs. John Terry and Co., of Great Winchester Street, E.C., that they have received from the Metropolitan Gas Company of Melbourne a cable advice informing them that their profits for the half year to June 30 were £97,280. A dividend of 6s. 6d. per share has been declared for the half year, a sum of £35,000 has been transferred to the reserve fund, and a balance carried forward of £54,156. Dividends will be payable in Melbourne probably to-day, and drafts to absentee shareholders will be posted by the first mail thereafter.

Last Saturday week, the employees of the Croydon Gas Company at Waddon gave an enjoyable garden party in the sports ground to a hundred wounded soldiers from local hospitals. The hosts, accompanied by their wives and families, did their utmost to entertain the guests; and these efforts were rewarded by perfect success. Games of all kinds were organized; and while these were in progress, light refreshments were distributed. At five o'clock there was tea, and afterwards an excellent concert. Among the representatives of the Company present were Mr. Charles Hussey (Chairman), Mr. W. Cash and Mr. J. Russell (Directors), Mr. W. W. Topley (Secretary), Mr. A. Caddick (Chief Engineer and Chairman of the Sports Committee), and Mr. W. J. Sandeman (Distributing Engineer).

NEWSPAPERS FOR NEUTRAL COUNTRIES.

The Secretary of the War Office has issued the following order:

> The public are informed that newspapers and other printed publications will not be sent to Neutral European Countries unless posted direct from the office of publishers or newsagents who have obtained permission from the War Office for this purpose. Persons desiring to send newspapers, &c., to Neutral European Countries should, therefore, give their orders for execution to publishers or newsagents who have obtained such permission.

The Publisher of the "JOURNAL" has obtained the required permission of the War Office; and he will, on receipt of instructions, forward copies direct from the office to any neutral country.

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No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer—not necessarily for publication, but as a proof of good faith.

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